

For Reference

NOT TO BE TAKEN FROM THIS ROOM

Ex libris
UNIVERSITATIS
ALBERTAENSIS



THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR PHUA SWEE LIANG

TITLE OF THESIS ABILITY-FACTORS AND FAMILIAL

..... PSYCHOSOCIAL CIRCUMSTANCES:

..... CHINESE AND MALAYS OF SINGAPORE.

DEGREE FOR WHICH THESIS WAS PRESENTED Ph. D.

YEAR THIS DEGREE GRANTED 1976

Permission is hereby granted to THE UNIVERSITY OF ALBERTA LIBRARY to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly or scientific research purposes only.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

THE UNIVERSITY OF ALBERTA
RELEASE FORM
NAME OF AUTHOR
TITLE OF THESIS
DEGREE
YEAR THIS DEGREE GRANTED
1976
THE UNIVERSITY OF ALBERTA
LIBRARY AND ARCHIVES
EDMONTON, ALBERTA
T6G 2G1
CANADA

Digitized by the Internet Archive
in 2021 with funding from
University of Alberta Libraries

<https://archive.org/details/Liang1976>

THE UNIVERSITY OF ALBERTA

ABILITY-FACTORS AND FAMILIAL PSYCHOSOCIAL CIRCUMSTANCES:

CHINESE AND MALAYS OF SINGAPORE

by

PHUA SWEE LIANG



A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

IN

EDUCATIONAL PSYCHOLOGY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

SPRING, 1976

THE UNIVERSITY OF ALBERTA
FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and
recommend to the Faculty of Graduate Studies and Research,
for acceptance, a thesis entitled
Ability-Factors And
Familial Psychosocial Circumstances: Chinese And Malays
.....
Of Singapore.
.....
submitted by Phua Swee Liang
.....
in partial fulfilment of the requirements for the degree of
Doctor of Philosophy in Educational Psychology.

Abstract

The two main purposes of this study were: 1.a) to investigate the patterns in a domain of school-related ability-factors across two samples of Singapore Chinese and Malay 14-year-old male pupils, and b), c), d) to similarly examine factor patterns in affective, process, and status domains of familial circumstances; and 2. to examine how the ability-factors relate to the affective-, process-, and status-factors.

An ability domain of 32 test measures was selected to define seven school-related elementary common factors. Principal component analysis followed by Promax oblique rotation produced nine first-order factors underlying this ability domain for both Chinese and Malay data separately. Loading interpretations confirmed by a mathematical factor-match identified eight equivalent factors across the Chinese and Malay patterns. These were Inductive Reasoning I, Number Facility, Flexibility of Closure, Speed of Closure, Spatial + Visualization, Verbal Reasoning, School-achievement and Inductive Reasoning II. The hypothesis that the emergent factors in both Chinese and Malay patterns would resemble the input factors defined by the tests selected, was confirmed in that the first seven above listed factors matched the predicted factors. Another hypothesis predicting the Chinese School-achievement factor to be more differentiated from its other within-pattern factors than its Malay counterpart would, was supported by the Squared Multiple Correlation between School-achievement and its corresponding within-pattern factors.

On the basis of Euro-American findings and the socio-cultural characteristics of the samples, three domains of familial psychosocial variables - affective, process, and status - were selected and the factors underlying each were in turn identified. The three factors in the affective domain were equivalent across Chinese and Malay patterns and resembled the three Schaefer original factors of Acceptance vs Rejection, Psychological Control, and Lax vs Firm Control. The two Chinese and Malay equivalent process factors were interpreted as Learning Environment and Independence vs Parental School-achievement Motivation. With respect to the status domain the two clearly equivalent Chinese and Malay factors were Elder's Occupational-Educational Status, and Sibling Size vs Maternal Occupational-Educational Status. The two remaining Malay factors, Paternal Occupational-Educational Status and Material Index represented components of the Chinese Paternal Occupational-Educational Status + Material Index factor while the unrelated Chinese factor was interpreted as Home Induction to School Languages.

Intercorrelations among factors within the domain-pairs of ability-affective, ability-process, and ability-status, and canonical correlations between significantly correlated psychosocial-factors and ability-factors were rather low, indicating weak across-domain relationships for both Chinese and Malay samples. A hypothesis stating that relative to the affective and status domains, the process domain would exhibit the strongest link with School-achievement and Verbal Reasoning was not confirmed.

A major finding of this study, which is in contrast to Euro-American findings is the weak relationship between familial psychosocial circumstances and ability-factors. This finding indicates that for these subjects school effects are much more independent of the nature of the homes than what have been found in Euro-American settings.

The above finding has important implications for theory in that it draws attention to the fact that the relation of familial psychosocial circumstances to ability-factors has to be viewed in the context of the relative interplay between the home and school in fashioning the abilities. It has notable implications for practice in that it points to the potency of schooling and suggests that Euro-American type of education may be implemented in schools irrespective of the nature of the homes.

ACKNOWLEDGEMENT

I would like to express my thanks and appreciation to the members of the Oral Examining Committee, Dr. R.S. MacArthur (Chairman), Dr. P.E. Vernon (External Examiner), Dr. L.R. Gue, Dr. S. Hunka, and Dr. E.W. Romaniuk for their time and effort in reading this thesis and for their constructive comments on it.

I am very grateful to my supervisor, Dr. R.S. MacArthur for his advice, encouragement and support throughout the study and Dr. S. Hunka for the invaluable discussions on the statistical treatments in this study.

Deep appreciation is also extended to Mr. Chan Kai Yau, the Deputy Director (Schools), Ministry of Education, Singapore for his introductory letter to the Principals of the participating schools.

I would like also to thank the school principals, teachers and pupils for their generous assistance and cooperation during my field-work in Singapore.

Finally, but not least, I would like to thank the Canadian Government which through the Canadian Commonwealth Scholarship and Fellowship Plan has provided the financial support for this study.

TABLE OF CONTENTS

CHAPTER		PAGE
I.	GENERAL PROBLEM	1
II.	SURVEY OF RELATED LITERATURE	6
	Patterns among Mental Tests	6
	Ability-factors and Environmental Experiences . .	9
	Environmental Experiences and Stability of Ability-factors	13
	Familial Psychosocial Circumstances and Ability-factors	21
	Summary	32
III.	DEFINITIONS, THEORETICAL RATIONALE, AND HYPOTHESES	37
	Definitions	37
	Theoretical Rationale	38
	Hypotheses	42
	Within-Ability-Domain - Hypothesis 1	42
	Hypothesis 2	43
	Within-Psychosocial-Domains - Hypothesis 3	43
	Between Ability Domain and Psychosocial Domains - Hypothesis 4	44
IV.	SAMPLES AND SAMPLING	45
	Samples	45
	Sampling	50
V.	INSTRUMENTATION AND PILOT TESTING	52
	Instrumentation	52
	Affective Domain	53

CHAPTER		PAGE
	Process Domain	55
	Status Domain	56
	Pilot Testing	57
	Treatment of HEQ Pilot Data	58
	Treatment of CRFBI (Mother Form) Data	60
VI.	PSYCHOSOCIAL MEASURES, ABILITY MEASURES, AND ADMINISTRATIVE PROCEDURES	62
	Measures in the Psychosocial Variable Domains	62
	Measures in the Ability Domain	63
	Test Administration Procedures	72
VII.	ANALYSIS I - WITHIN-DOMAIN FACTOR PATTERNS AND HYPOTHESES TESTING	75
	Within-Domain Factor Patterns	75
	Within-Ability-Domain Factor Patterns	75
	Equivalent Chinese and Malay Ability-Factors	83
	Unrelated Chinese and Malay Ability-Factors	86
	Within-Affective-Domain Factor Patterns	89
	Within-Process-Domain Factor Patterns	95
	Within-Status-Domain Factor Patterns	99
	Testing of Within-Ability-Domain Hypotheses	106
	Hypothesis 1	106
	Hypothesis 2	107
	Testing of Within-Psychosocial Domain Hypothesis	109
	Hypothesis 3	109

CHAPTER	PAGE
VIII. ANALYSIS II - BETWEEN-DOMAIN RELATIONS AND HYPOTHESIS TESTING.	111
Relating Ability Domain and Each of Three Psychosocial Domains	111
Chinese Ability-Affective Relations	114
Chinese Ability-Process Relations	114
Chinese Ability-Status Relations	114
Chinese Relation of Familial Psychosocial Circumstances to Ability-factors	115
Malay Ability-Affective Relations	115
Malay Ability-Process Relations	115
Malay Ability-Status Relations	115
Malay Relation of Familial Psychosocial Circumstances to Ability-factors	117
Ability-factors Unrelated to Familial Psychosocial Circumstances	118
Canonical Relations between Contributory Ability-factors and Psychosocial-factors	118
Chinese Ability-Psychosocial Canonical Relations	121
Malay Ability-Psychosocial Canonical Relations	121
Between-Domain Hypothesis Testing	122
Hypothesis 4	122
IX. SUMMARY, DISCUSSION, AND IMPLICATIONS	124
Summary and Discussion of Findings	124
Within-Domain Patterns	124

CHAPTER	PAGE
Chinese and Malay Ability-patterns	124
Chinese and Malay Affective-patterns	127
Chinese and Malay Process-patterns	127
Chinese and Malay Status-patterns	127
Between-Domain Relations	128
Significant Findings of this Study	132
Implications	132
Implications for Theory	132
Implications for Practice	135
Implications for Research	136
* * *	
REFERENCES	138
APPENDIX I. Home Environment Questionnaire	146
APPENDIX II. Rating Scheme for HEQ Items	176
APPENDIX III. Schaefer Children's Reports of Parental Behaviour Inventory (CRPBI)	191
CRPBI Scales and their Corresponding Items, and Scoring Sheet	200
APPENDIX IV. List of Participating Schools	207
APPENDIX V. Means and Standard Deviations of Ability Measures for Chinese and Malay Samples	209
APPENDIX VI. Intercorrelations among Ability Measures for Chinese and Malay Samples	211
APPENDIX VII. Means and Standard Deviations of Affective, Process, and Status Variables for Chinese and Malay Samples	214

CHAPTER		PAGE
APPENDIX VIII.	Intercorrelations Among 1) Affective Variables, 2) Process Variables, and 3) Status Variables for Chinese and Malay Samples	217
APPENDIX IX	Sample Items of Test Measures in the Ability Domain	220

LIST OF TABLES

Table	Description	Page
1	Descriptive Data of Chinese and Malay Samples	51
2	Reliability of Judges' Ratings on Five Process Variables	60
3	Testing Schedule	73
4	Eigenvalues and Percentage of Total Variance Accounted for by First 9 Unrotated Principal Components (Elementary Ability-factors)	78
5	Chinese Promax Oblique First-order Ability Pattern	79
6	Malay Promax Oblique First-order Ability Pattern	80
7	Factor Matching for Promax Oblique First-order Ability Patterns of Chinese and Malay Samples	82
8	Promax Oblique First-order Ability Patterns for Chinese and Malay Samples	88
9	Unrotated Principal Compound Factors of CRPBI (Mother Form) for Chinese and Malay Samples	90
10	Varimax Rotated Factors of CRPBI for Walloon, Chinese, and Malay Samples	92
11	Kaiser et al Rotated CRPBI Cosine Values Between Target Factor Matrix and Rotated Factor Matrix for Three Ethnic Samples	94
12	Chinese and Malay First-order Unrotated Process-factors With Their Associated Eigenvalues and Percentage of Total Variance	97
13	Promax Oblique First-order Process Patterns for Chinese and Malay Samples	98
14	Kaiser et al Rotated Process Cosine Values Between Target Matrix and Rotated Factor Matrix	100
15	Chinese and Malay First-order Unrotated Status-factors With Their Associated Eigenvalues and Percentage of Total Variance	103

Table	Description	Page
16	Promax Oblique First-order Status Patterns for Chinese and Malay Samples	104
17	Kaiser et al Rotated Status Cosine Values Between Target Matrix and Rotated Factor Matrix	105
18	Intercorrelations Between Ability-factors (Cols.) and Affective-, Process-, and Status-factors (Rows) for the Chinese Sample	112
19	Intercorrelations Between Ability-factors (Cols.) and Affective-, Process-, and Status-factors (Rows) for the Malay Sample	113
20	Significant Correlations of Ability-factors with Affective-, Process-, and Status factors for Chinese and Malay Samples	116
21	Canonical Loadings for the Ability-factors and Psychosocial-factors (Chinese)	119
22	Canonical Loadings for the Ability-factors and Psychosocial-factors (Malays)	120

LIST OF FIGURES

Figure		Page
1	Eigenvalue Profiles for the Test Measures (Principal Axes Factor Analyses for Chinese and Malay Sample)	77
2	Eigenvalue Profiles for the Process Variables (Principal Axes Factor Analyses for Chinese and Malay Samples)	96
3	Eigenvalue Profiles for the Status Variables (Principal Axes Factor Analyses for Chinese and Malay Samples)	101
4	Significantly Related Ability-factors and Affective-, Process-, and Status-factors for Chinese and Malay Samples	123

CHAPTER I

GENERAL PROBLEM

The present study investigates the major underlying dimensions characterizing a domain of tests measuring school-related abilities, and examines the generalizability of Euro-American trends concerning the relation of differential abilities to familial psychosocial circumstances for Chinese and Malay boys of Singapore. These are two non-Euro-American ethnic groups differing in traditional cultures but having been inducted to a common English-instructed Euro-American-evolved type of schooling.

Coherence among tests within the ability domain has been fruitfully demonstrated through factor-analytic studies. Depending upon the theoretical rationale and the factoring technique adopted, different but reconcilable patterns among tests have emerged. Thus factors, such as verbal-educational (v:ed), spatial-perceptual-practical (k:m), and inductive reasoning (i) (Vernon, 1969; MacArthur, 1973; 1974); fluid (Gf) and crystallized (Gc) intelligence (Cattell, 1963; Horn & Cattell, 1966); Visualization (Gv) and Speed (Gs) (Horn, 1968); the well-known and extensively used Thurstone's Primary Mental Abilities (PMA) of Verbal (V), Number (N), Reasoning (R), Space or Visualization (S), Perceptual Speed (P), Inductive Reasoning (I), Rote Memory (R), Deductive Reasoning (D), and Word Fluency (W) (Thurstone, 1938); and the cognitive factors associated with the French, Ekstrom, and Price (FEP) kit of reference tests (French, et al, 1963); represent some of the functional unities commonly identified within the mental ability domain. Generally

factors like the PMA or the FEP primary abilities are considered to be more elementary or narrow abilities while those like v:ed, k:m, Gf, Gc and their equivalents represent broader abilities.

Empirical studies on the patterning of abilities, taken together, indicate that the elementary primary abilities of the FEP type appear to be stable both within Euro-American cultures (Hakstian & Cattell, 1974), and across diverse non-Euro-American cultural groups which have been inducted to the Euro-American system of education. This provides a basis for the establishment of similar abilities to be used for group comparisons into the relation of abilities to familial psychosocial circumstances.

Investigations into the relationships between home environmental characteristics and mental abilities generally adopt one of two common procedural approaches. One approach involves directly measuring postulated effective environmental variables and studying the extent of association these have with the particular abilities of interest or molar measures of them. The other approach is associated with group comparisons of patterns of abilities. This methodology of investigation involves identifying cohorts of subjects who are characterized by a particular environmental characteristic and examining their patterning of abilities.

Both these lines of investigation have uncovered a wide range of possible environmental correlates of mental abilities for Euro-American cultural groups. Generally they fall into three main categories; namely, affective (Hurley, 1965), process (Bloom, 1964), and status

variables, which in the context of this study will be subsumed under the generic term 'psychosocial' variables. Affective variables may be viewed as the emotive-experiential accompaniments of parent-child interactional processes that are likely to affect the child's inclinations to explore the 'physical, interpersonal, and ideational aspects of the environment'(Hurley, 1965; p. 19), such as warmth, hostility and affection. Process variables concern the more dynamic and purposeful interactions between parent and child that bear directly on the cognitive development of the latter; examples of these are, 'Parental Aspirations for Child's Education', 'Direct Teaching Activities', 'Educational Activities', and 'Encouragement for Activeness'. Finally, status variables represent the more tangible aspects of the home, such as family structure, or socioeconomic indicants like parental occupation, amount and quality of modern appliances, and other similar forms of material wealth.

Individual studies vary in the emphases given to particular categories of home environmental variables, but comparisons on the relative degree of association between status and process variables, each separately with abilities have been made. In the last decade, a series of studies pioneered by the works of Wolf and his colleagues at Chicago (Wolf, 1964b), have to a large extent established the relatively stronger association between the process variables and mental abilities. Similar comparisons have yet to be made with the affective category, but suggestive evidence presented by child developmental studies (Hurley, 1965; Horn, 1970; Bayley, 1971), calls for consideration to be given to

this category of familial psychosocial variables.

Arising from the potpourri of studies on the relation of abilities to familial psychosocial circumstances are the consistent findings on the relatively stronger link for process variables. The cumulative learning models of abilities (Hebb, 1949; Piaget, 1964; Ferguson, 1954; 1956; Gagné, 1968; Horn, 1968) have presented a case for early learning in the home. Considering that the home is the child's first encounter with his learning environment, what is learnt there represents the prerequisite learning upon which the school can build related and more complex skills. This is particularly so for verbal abilities in Euro-American context, where the home and school mutually reinforce each other in fostering these abilities. Whether this relatively stronger link in favour of process variables can be generalized to groups for whom the home and school are not mutually reinforcing institutions is a moot point.

There have been indications from some Euro-American studies that absence of familial psychosocial supports for ability development can be compensated by schooling effects. A case in point is this observation made by Douglas et al (1968).

"...deficiencies of interest and ambition on the part of parents are, to a large extent, offset by good teaching".
(p. 179)

It may be argued that this compensatory role of schooling effects can also be extended to other familial psychosocial variables. Horn and Vernon have frequently underlined in their writings, that some abilities can be developed under the aegis of the school, and some of Vernon's

cross-cultural findings (1969) have reflected this. A stronger case can be made for this compensatory function of schooling for children whose verbal abilities have been measured and developed primarily through a language not frequently used in the home. Clearly, in such a situation, the more crucial factor is the child's own responsiveness to schooling.

Circumstances which would affect this responsiveness to schooling are more likely to be nutritional and health conditions, or even genetic equipment. In reality, these 'factors' often go along with status variables such as socioeconomic status, and educational and occupational level of parents. Status variables per se may not contribute substantially to the link of familial psychosocial circumstances to abilities, but when they operate as indicators of such underlying familial psychosocial circumstances, then their impact may be realized. In addition, affective variables may also affect the child's responsiveness to schooling in that the type of discipline he receives at home may, or may not equip him with the mental discipline for school work.

In the light of the preceding discussions, the purposes of this study are: 1.a) to investigate the patterns in a domain of school-related ability-factors across two samples of Singapore Chinese and Malay 14-year-old male pupils and b), c), d) to similarly examine factor patterns in affective, process and status domains of familial circumstances; and 2) to examine how the ability-factors generated relate to familial psychosocial circumstances that Euro-American studies have consistently identified as correlates of abilities.

CHAPTER II

SURVEY OF RELATED LITERATURE

Patterns among Mental Tests

The theoretical and methodological substrate for structuring within the mental ability domain had its genesis in the two-factor theory of Spearman (1927). Examining the consistent phenomenon of positive intercorrelations among the varied putative intelligence tests of his day led Spearman to formulate, by means of the tetrad technique, the theory that every ability has two underlying components namely, a general mental capacity factor 'g', which is common among all tests, and a specific factor 's', which is unique to the particular cognitive task. In operational terms, 'g' is the capacity to 'perceive relations and educe correlates'. It depends on the mental energy one is endowed with at birth and hence is innate and relatively fixed while the s-factors are largely the crystallizations of education and training related to the task (Vernon, 1961; p. 13).

A shortcoming of Spearman's theory lies in its omission of intermediate group factors between the all-embracing 'g' factor at one extreme and the unique s-factors at the other. Empirical data tended to negate the practical validity of the theory, and rather to point to the existence of broad group factors which arose as a result of overlapping between s-factors.

The question of a nexus between the s-factors was approached by Thurstone's development of the multiple factor analytic technique

(Thurstone, 1931). In 1938, he applied this analytic tool to ability data and obtained what appeared then, to be a totally different structural picture of the intellect from Spearman's. Thurstone's result established the existence of a series of distinct primary factors, of which the well-known and extensively used Thurstone Primary Mental Abilities (PMA) were: Verbal (V), Number (N), Perceptual Speed (P), Inductive Reasoning (I), Rote Memory (R), Deductive Reasoning (D), Word Fluency (W), and Speed and Visualization (S).. Later analytical studies demonstrated that Thurstone's PMA and Spearman's 'g' were reconcilable in that further factoring of the PMA produced a single factor. A more comprehensive mapping of primary abilities was subsequently undertaken by French (1951) and later revised by French, Ekstrom, and Price (1963). A more recent study by Hakstian and Cattell (1974) demonstrated the replicability of some of the French, Ekstrom and Price (FEP) primary abilities.

Burt (1949) introduced the concept of hierarchy in the structuring of abilities. His hierarchical structure consisted of an overall general ability which subdivides into two broad group factors of intellectual ability and practical ability. These two broad factors in turn could undergo further differentiation into minor group factors, three of which had been identified as mechanical memory, visual perception, and motor dexterity.

Vernon advanced Burt's hierarchical theory by elaborating on a more fully differentiated model (1965; 1969). His model is analogous to a genealogical tree, with 'g' the 'universal' among all tests at the

peak. Once the 'g' component is removed, the residuals of tests fall into one of two major factors - verbal-educational (v:ed), and spatial-perceptual-practical (k:m). Each of these can be further subdivided into more minor group factors such as verbal fluency, number, and the creative factors under v:ed and spatial, psychomotor, and mechanical information factors under k:m. Finer sub-division of these minor factors into specific factors of the Spearman-type is also possible, but these according to Vernon, are too trivial to be of any significance. Vernon also drew attention to the likelihood of intermediate group factors between the major and minor group factors.

Integrating the Burt-Vernon hierarchical structure and Thurstone's PMA pattern is Cattell's theory of fluid and crystallized intelligence (1963). This theory distinguishes between two distinct, but 'interrelated and cooperative' factors above the level of Thurstone's PMA, which Cattell called fluid (Gf) and crystallized (Gc) intelligence. Subsequent testing and revisions of the theory (Horn & Cattell, 1966; Horn, 1966; 1968; Cattell, 1971) led to the crystallization of the Triadic Theory of ability structuring. According to the present form (Hakstian & Cattell, 1974), the organization of abilities may be conceptualized to be at three levels - 1) the highest order stratum of broad capacities of which the original fluid and crystallized intelligence are but only two examples, 2) the intermediate stratum of 'provincial powers' such as visual and auditory organizing powers, and 3) the first order stratum of primary abilities, which in this theory has been given the psychological term of agencies by Cattell. The relations between these

strata have also been diagrammatically represented (Horn, 1966b; p. 557, Horn, 1972; p. 498).

There are other models for describing structurings among tests but for the purposes of the present study the above discussion will suffice.

Ability-factors and Environmental Experiences

Parallel to the developments achieved in describing the wide range of mental tests parsimoniously in terms of ability-factors or patterns were also efforts made to relate such factors to environmental experiences. Thus, Spearman's s-factors represented the component of tests that are largely the result of education and training related to the specific task. Vernon has made frequent references to the emergence of factors through contiguous educational and training experiences. He underlined that any factorial pattern or structure is not invariant but can change, depending on the type of education and training. Inherent in Tryon's second mechanism in accounting for intercorrelations among tests was also the recognition given to environmental influences (Anastasi, 1970; p. 900).

Cattell's Triadic Theory established a more definitive link between ability-factors and environmental circumstances during development. An important aspect of the theory lies in the integrating principles advanced to explain how primary mental abilities become organized into broad capacities like Gf and Gc. In his initial formulation of the theory, Cattell gave the impression that Gf represented innate capacity, uninfluenced by nurture, while Gc represented the interactive

product of an individual's Gf and his culture. Subsequent refinements of the theory, as noted above, led to modifications in the interpretations of Gf and Gc, and hence the nature of environmental experiences associated with the development of each. The basic conceptual difference between Gf and Gc is best given in this statement by Horn (1966b):

"The distinction between Gf and Gc is thus not conceived as a difference between physiological and experiential origin but between two kinds of experience in which the physiological potential becomes expressed."
(p. 555)

Gf experiences represent the relatively common aspects which are essentially universals in our physical world whereas Gc is closely linked with the more culturally embedded experiences.

The articulation between ability organizations and learning finds expression in the learning theories of Ferguson (1954; 1956) and Gagné (1968). Ferguson proposed his 'limits of learning' theory in an attempt to reconcile ability-factors with learning, and consequently environmental experiences. He regarded abilities as prior 'overlearned acquisitions' that have reached relative stability. His theory draws upon the principle of transfer of learning to account for the emergence of ability-factors. Through the mechanism of positive transfer, the learning of one intellectual task enhances the learning of other similar tasks. Consequently, these related tasks would be positively correlated as have been observed for various classes of related tests of intellectual abilities, such as tests of various aspects of verbal reasoning and others. Ferguson's concept of the relationship between ability-level

and the differentiation of abilities, as contained in this statement,

"As the learning of a particular task continues, the ability to perform it becomes gradually differentiated from, although not necessarily independent of other abilities which facilitate this differentiation"
(1954; p. 110)

implies the existence of a hierarchical ordering of abilities (Messick, 1972; p. 361). Furthermore, implicit in this statement is also the notion that the level of ability determines the extent of differentiation among abilities. In other words, given a number of similar tasks, a more differentiated pattern of abilities would emerge for groups of individuals who have attained a higher mastery level than for those at a lower level.

Ferguson further emphasized that abilities are the interactive product of an individual's biological propensities and cultural preferences for certain kinds of learning at particular age levels. This accounts for the emergence of different patterns of abilities among people of diverse cultural backgrounds as well as the variations in factorial loadings of the same test used in different environmental settings.

Gagné (1968) contended that mental ability entails a cumulative process, during which skills of increasing complexity are progressively built upon earlier-learned simpler ones. These various skills form a transfer hierarchy, ranging from simple stimulus-response connections through chains (motor and verbal), multiple discriminations, concepts, and simple rules to complex rules at the peak of the hierarchy. This

transfer hierarchy of Gagné's can be viewed as an analog to a hierarchy of ability-factors. It follows from this standpoint that cultural preferences prescribe what should be learnt at particular levels, and that the nature of this hierarchy would vary across cultural groups.

Conceptualization of factor formation as cumulative learning is also supported by a number of other writers. Carroll (1966) attributed the formation of factors to a number of possible causes, amongst which are prerequisite learning, transfer of learning and co-occurrences of experiences under the aegis of the home, the school and the community. Horn (1967, 1968) described ability-factors as compounds resulting from the welding of anlage functions, aids, and concepts. These three skills form a hierarchy of increasing complexity in the direction of anlage functions, aids and concepts. The acquisition of the two more complex skills of aids and concepts also involves accretion of learning. Not denigrating the role of positive transfer, Horn maintained that avoidance-learning can also bring about intercorrelations among tasks for which no transfer effect exists. He explicated (1967) how both positive transfer of learning and avoidance-learning can operate within the school system to influence the development of abilities. That Vernon shared similar views with Horn is shown in this statement of his,

"...much of the phenomena on mental growth and decline can be explained in terms of transfer and motivation."
(1969; p. 81)

Both Horn and Vernon take the stand that effective schooling has a bearing on the formation of abilities.

The relation between ability-factors and environmental circumstances identified through factor analysis also finds support in the recognition of environmental circumstances in the Piagetian system of approach to the development of cognitive abilities (Vernon, 1965; Anastasi, 1970; Messick, 1972).

It is evident from the above discussions that there is considerable theoretical convergence (factorial, learning, and developmental) on the important role of experiential differences in influencing the development of, and organization of abilities. However, this theoretical consideration provides no elucidation on what constitutes favourable environmental conditions or what cultural characteristics favour the formation of what types of abilities. It follows therefore that the identification of environmental conditions associated with the emergence of ability-factors will have to be approached empirically.

Environmental Experiences and Stability of Ability-factors

Studies on the patterning of abilities of groups distinguished by 'specific' environmental characteristics appear to substantiate the theoretical viewpoint that the differentiation of abilities is bound up with the relevant experiences the child encounters in the course of development. Some of these experiences have been found to relate to schooling, some to familial psychosocial circumstances, and others to ecological characteristics in the environment at large.

Filella (1960) demonstrated how different ability-factors can emerge from the same battery of tests as a result of educational and socioeconomic differences. He administered a battery of six tests,

adapted for Colombian use from the Differential Aptitude Test Battery, to high school boys in Colombia, South America. Two groups differing in educational experiences were drawn from the Technical High School boys and Academic High School boys separately, while the two socioeconomic level groups were drawn from the private and public high school boys who followed a common curriculum but differed on socioeconomic levels. Though two factors were identified in both the patterns of the Technical High School and Academic High School groups, the nature of these two factors defined by tests yielding high loadings, differed among the groups. In the former group pattern, the two factors were best described as quantitative reasoning and spatial-mechanical reasoning while in the latter group, they were best described as verbal and non-verbal. Socioeconomic-comparisons on the ability patterns revealed that the high socioeconomic level group exhibited a sharper differentiation between verbal and non-verbal factors, and the nature of these factors also differed among the groups. In the high socioeconomic group (represented by the private high schools) the verbal factor was a broad academic factor resembling Vernon's v:ed while the non-verbal factor was considered a non-verbal reasoning factor having numerical, mechanical and spatial components. In the low socioeconomic group (represented by the public high schools) the verbal factor was defined strictly by verbal tests while the non-verbal factor was identified as a mechanical-spatial factor, resembling Vernon's k:m factor.

Similar cross-socioeconomic-class and cross-school-curricular comparisons of ability patterning were made by Dockrell (1966) with English school children from primary schools, and Grammar (Academic),

Technical, and Modern (General) secondary schools. Starting from the theoretical position of Ferguson (1954) and Vernon (1961), he hypothesized certain differences in the differentiation and nature of abilities to be associated with socioeconomic and school curricular variants. A battery of tests, sampling verbal and non-verbal aptitudes, linguistic and numerical skills, and practical and spatial abilities was administered to 10-, 12-, and 14-year -old school children classified as middle or lower social class groups on the basis of their fathers' occupations. Within each social class group of 12- and 14-year-olds were also subgroups distinguished by Academic, Technical, and General type of education. Cross-social-group comparisons of ability patterning results confirmed Dockrell's original hypothesis that middle-class groups would exhibit a greater degree of differentiation of abilities than the lower class group. Comparisons among the patterns pertaining to different type of schools for the 12- and 14-year old pupils revealed sharper differentiation in abilities for the Academic and Technical types than for the General type.

Vernon (1969) found evidence of schooling and cultural effects in the differentiation of abilities among the English, Hebridean, Jamaican, Ugandan, and Canadian Indians and Eskimos which he tested with his extensive and diversive battery of individual and group tests. Though there were generally cross-cultural similarities in the main ability-factors underlying his battery of tests for the English, Eskimo and Canadian Indian groups, there were some significant variations in the Hebridean, Jamaican and Ugandan groups. For example, in the Hebridean and Jamaican patterns, the g factor appeared to fuse with the

v:ed factor, giving rise to a g:v factor which also loaded on non-educational tests. This indicated that the verbal, reasoning, and perceptual abilities for these groups were less clearly differentiated. In the light of this g:v factor's correlation with environmental characteristics, Vernon interpreted it to reflect 'modern sophistication and cultural stimulus vs traditional and restricted' way of life for the Hebridean group, and the role of schooling for the Jamaican group. In the Ugandan group no g factor was identified, but there emerged a distinct v:ed factor with negligible loadings on Matrices, Draw-a-Man and Koh's tests. This factor was interpreted as highlighting the heavy reliance of school-achievement on the specialized ability to acquire the English language in the case of the Ugandan pupils.

Another extensive cross-cultural investigation was carried out by Irvine (1969) with Elementary and Secondary High School pupils in Kenya, Zambia, and Rhodesia. Irvine employed group tests sampling verbal, numerical, spatial, mechanical and perceptual tasks. Cross-ethnic similarity occurred with broad factors which Irvine interpreted as closely allied to the drill skills which were necessary for school success for the samples he used. Thus, the greatest cross-ethnic consistency was found with overlearned drill skills such as language usage, and mechanics of Arithmetic, while least consistency occurred with abilities like perceptual and reasoning skills which are more dependent on culturally diverse learning outside of school.

In his cross-cultural studies on the patterning of abilities with reference to Central Canadian Inuit , Nsenga Zambians, Northwest Green-

land Eskimos, and Alberta Whites, MacArthur (1973a; 1973b; 1974a; 1974b) obtained findings which appeared to jibe with those obtained by Vernon. Using another extensive and diversive battery of tests, though a variant of Vernon's, MacArthur obtained a relatively consistent pattern of three first-order broad oblique factors underlying his battery of tests for all the groups he tested. These three factors, identified by him as verbal-educational (v:ed), spatial-field-independence (k:m) and inductive reasoning (i) are similar to the three main ability-factors of verbal-educational (v:ed), spatial-perceptual-practical (k:m) and general reasoning (g), Vernon obtained with his battery of tests and groups of subjects.

In spite of the relative consistency of the three factors, MacArthur (1974b) observed notable ethnic differences in patterning, caused by some merging or splitting within this framework of three factors. Thus, though his Eskimo, Inuit and Alberta White samples generally exhibited the three identified factors in their patterning, in the Nsenga Zambian pattern, the v:ed and i factors merged into one factor. This Nsenga feature resembles the same feature Vernon had found in his Jamaican and Ugandan groups. Likewise, the findings on the Eskimos and Canadian Indians corroborated Vernon's findings on similar indigenous groups in Canada.

MacArthur (1974a) also compared the relative strengths of his groups on the three consistent ability-factors (assessed through their main marker tests) and noted that the abilities least affected by Native-White background differences were those involving inductive

reasoning from non-verbal stimuli, while those most affected pertained to the verbal-educational factor. In addition, the non-verbal abilities of the Indians and Eskimos were not restricted to concrete operations but involved abstract symbolic representations. MacArthur attributed the strengths of Canadian Indians and Eskimos on the non-verbal abilities to ecological and child upbringing 'factors'.

It would appear from the findings of Vernon, Irvine and MacArthur, that with non-Euro-American cultural groups, abilities associated with the verbal-educational factor tended to tie up with the particular ability of learning the English language, the verbal medium through which these abilities were assessed.

Investigations into the cross-cultural generality of the more elemental primary abilities have also received considerable attention. Vandenberg (1967) examined the cross-cultural generality of the Thurstone PMAs with Chinese college students in America and Spanish speaking South American college students. Administering a large battery of PMA tests in English and the native language of the respective groups, Vandenberg identified seven similar factors among the two groups. These were identified as Native language ability, Verbal ability, Memory, Spatial, Reasoning, Perceptual Speed and Number ability.

El Abd (1970) administered a battery of 14 tests, covering the primary abilities of Flexibility of Closure, Speed of Closure, Number Facility, Word Fluency, Verbal Comprehension, Spatial Orientation, and Perceptual Speed to two samples of African students - Higher School Certificate boys and male University undergraduates. The cross-group

factorial patterns turned out to be similar and though Al Abd used the Guilford Structure of Intellect model to label these equivalent factors, in terms of the traditional PMA terminology, the seven interpretable factors resembled the input ability-factors.

The consistent findings on the relatively stable PMAs, obtained by Vandenberg and El Abd were corroborated by findings from a study on younger subjects. Flores and Evans (1972) carried out a comparative factorial study on two Canadian and two Filipino samples of Grade 6 and Grade 8 boys. A battery of 18 tests, consisting of the Raven Progressive Matrices test, and selected tests from Thurstone's PMA battery and the FEP kit of reference tests for cognitive factors, was chosen to define these primary abilities of Word Fluency, Spatial Facility, Perceptual Speed, Arithmetic, Numerical Facility, Reasoning and Associative Memory. It was found that the resulting factor patterns for all four samples generally had similar factors, though a slight variation in composition of tests existed among the factors for different groups. Though the hierarchical factoring procedure was used, the nature of the factors which emerged for all groups resembled the PMAs of Verbal Comprehension, Numerical Facility, Spatial Facility, Associative Memory, and Induction.

A more comprehensive check on the reproducibility of primary abilities was carried out recently by Hakstian and Cattell (1974). They administered a large battery of 57 tests covering a comprehensive range of identified primary abilities to 347 young adult residents of Edmonton and its vicinity. By a careful selection of 3 marker tests per

factor they were able to reproduce their predicted input primary abilities. These were identified as Verbal Comprehension (V), Induction (I), Spatial Orientation (S), Perceptual (Clerical) Speed (P), Flexibility of Closure (Cf), Speed of Closure (Cs), Span Memory (Ms), Meaningful Memory (Mm), Associative Memory (Ma), Mechanical Knowledge (Mk), Aiming (A), Ideational Fluency (Fi), Word Fluency (Fw), Originality (O), Divergent Production of Semantic Classes (DMC), Spelling (Sp), Esthetic Judgment (E), and Representational Drawing (Rd). It has yet to be demonstrated whether this whole collection of primaries may be reproduced with other groups of subjects, but the reproducibility of some of the primaries does reaffirm Royce's contention (1973) concerning their invariance.

In summing up, the studies cited in this section have shown that ability-factors underlying the same battery of tests may vary across different cultural groups. Within the same culture, subgroups distinguished by differences in specialized training or socioeconomic standing may also exhibit different ability-factors underlying the same battery of tests. For subjects who are non-native speakers of English, the ability-factors underlying tests with high verbal contents may be clouded by the specific ability of learning the English language. The elementary common ability-factors (Horn, 1972) appear to be relatively stable among Euro-American subjects and subjects of other cultural groups who have been exposed to Euro-American educational treatments, and acculturation. In this respect, they provide a potential source of common abilities for use in comparative studies on the relation of

familial psychosocial circumstances to abilities. From the standpoint of cumulative learning theory, they should also be the more important abilities to be considered, since they represent the elementary processes upon which more complex skills develop.

Familial Psychosocial Circumstances and Ability-factors

Most of the earlier studies on the relation of familial psychosocial circumstances to ability-factors tended to identify status variables of the home, such as material possessions, parental occupation, family income, family size and structure, or more global indices such as social class, and examine how these related to gross measures of intelligent behaviour, such as IQ scores. Typical instruments sampling this type of home variables have been covered by Mosychuk (1969) in his review of literature.

Later studies however, have demonstrated a more comprehensive sampling of familial psychosocial variables to include additional variables which characterized the more dynamic aspects of the home environment or in Bloom's terminology (Bloom, 1964), environmental processes. One such study was carried out in Aberdeen by Fraser (1959) on a representative sample of 408, 12-year-old secondary pupils. Data on the material, cultural, motivational, and emotional aspects of the home were obtained by interviews. Each of the home variables measured - Parents' education rating, General book reading in home, Newspaper and magazine reading, Income, Family size, Living space, Occupation, Abnormal or broken home, Parents' educational and vocational aspirations, Parental encouragement, General family atmosphere, and Mother at work -

were correlated with general intelligence scores and a measure of school-achievement. The significant correlations obtained, ranged between .28 to .66, but of these, the highest value occurred with the variable, 'Parental Encouragement' for both cognitive measures. Only one variable exhibited non-significant correlational relationship with both IQ and school-achievement, namely, the 'Mother at work' variable. Another noteworthy feature shown in the correlational findings is that all variables appeared to have higher correlations with school-achievement than with IQ.

Another noteworthy study on the relationship between home environment and test performance was conducted by Douglas (1964) in Britain. He examined the home conditions of 5000 children born within the first week of March, 1946, during infancy, 8 years and 11 years of age. The home variables studied covered housing conditions, family size, paternal and maternal education and social class, parents' interests and aspirations, and parental encouragement and educational ambition for the child. The cognitive measures included intelligence, English and Arithmetic tests, and 11+ selection results. Analyses were carried out to examine the effects that differences on each of the home variables would have on average test scores at age 8 and 11 years. It was found that generally, parental encouragement and educational ambition for the child exhibited greatest influence, though overcrowding, unsatisfactory housing conditions and family size were also relevant 'factors'. Furthermore these variables exhibited cumulative effects during the 8-11 period. It was also noted that some variables appeared to operate

differently in different social class. For example, children from middle-class homes were less influenced by their parents' attitudes than were children from working-class homes.

The phenomenon that home conditions may operate differently in different social classes in Britain as observed by Douglas, was corroborated by findings from a study by Swift (1967). Swift investigated the association between family environment and 11+ success in an attempt to identify some familial predictors for 11+ success. He defined his family environment in terms of these variables - economic characteristic, family structure, occupational status, and parental educational experience and attitudes. The economic characteristic variable was assessed by a material index computed by giving a score of 1 to house-ownership, car-ownership, father's weekly take-home pay if more than thirteen pounds, and rooms-persons ratio of the family more than 1. The findings revealed that father's occupation had a stronger link with 11+ success than mother's occupation before marriage; parental education was related to 11+ success for working class families but appeared to be of less importance for middle class families. Social class membership also had an effect on the relation between 'Material Index' and 'Parental Attitudes to School' and 11+ success. Thus 'Material Index' was found to have significant association with 11+ success, but when the sample was broken down into middle-class and working-class subgroups, no significant relationship existed for the middle-class group. Also, working-class families who saw clearly the link between education and economic success tended to have successful children, but

this was less so in the middle-class group.

In each of the ethnic samples Vernon had tested (op cit), he correlated each of the emergent ability-factors with home background data which he collected from interviews. From his results over all the cultural groups, it may be inferred that generally, the verbal abilities were highly associated with home variables, such as 'Cultural Stimulus', 'Linguistic Background', and 'Planfulness in the Home'; while non-verbal abilities, more specifically spatial-perceptual abilities were either associated with Masculine Dominance in the home and Encouragement of Initiative, or not correlated with any home environmental variables. The relationship of Socioeconomic Status to abilities was not very clear-cut, but when it was associated with any ability it tended to exhibit a moderate correlation. A striking feature which emerged at the cross-cultural level was that there was evidence of the home environmental variables relating differently to abilities in different cultural groups. For example, in the Eskimo group, the g factor did not correlate with Socioeconomic Status, Cultural Stimulus nor Planfulness in the Home and in the Ugandan group, Socioeconomic Status was most highly correlated with the verbal ability-factor.

Pioneered by Wolf and his colleagues at Chicago (1964b), a series of studies had been conducted to demonstrate that relative to status variables, process variables of the home were more closely linked to abilities. The Chicago technology of measurement conceptualized the total home environment surrounding an individual as being composed of a complex system of subenvironments, each of which is related to the

development of a 'specific' characteristic. Furthermore for any individual characteristic, a subenvironment that is likely to affect its development can be identified and assessed through behavioural characteristics.

Thus, Wolf (1964a) adopted the above methodology in studying the link between home environmental circumstances and general intelligence as assessed through the Henmon-Nelson Test of Mental Ability. Wolf's subenvironment consisted of three press variables - Press for School-achievement Motivation, Press for Language Development, and Provisions for General Learning. These three process variables taken together resembled Vernon's 'Cultural Stimulus' and 'Linguistic Background' variables. Wolf developed an interview schedule to collect the data from the mother of each of his child subjects. The total score on these three variables was found to correlate .69 with the intelligence measure. The status variables sampled for investigation were father's occupation, a combined rating of parent education, and an index of social class representing a weighted combination of ratings of occupation, source of income, type of house and dwelling area. It was found that the process variables gave a multiple correlation of .76 with the intelligence measure, in contrast to .40 for the status variables with intelligence.

Dave (1963) had applied the same methodology to measure the educational environment of the home he hypothesized would bear a relationship with school-achievement. The total scores on his six process variables (Achievement Press, Language Models, Academic Guidance,

Activeness of the Family, Intellectuality in the Home, and Work Habits in the Family) when correlated with school-achievement (measured by the IOWA Test of Basic Skills) gave a correlation of .80, as against .02 for the combined scores on the status variables (similar to those used in Wolf's study) with school-achievement. Dave's study was replicated on Trinidad elementary school children by Dyer (1967) and much the same result was obtained. Plowden et al (1967) also found somewhat similar results in favour of a stronger link between process variables and reading ability. Of the process variables (Aspirations for the Child, Literacy of the Home, Parental Interest in Schoolwork) and status variables (Father's education, Mother's education, Father's occupational group, Number of dependent children, Physical activities of the home), examined in relation to reading ability, they found that the former variables contributed more substantially to reading ability.

Following along the lines of the Chicago school of investigation, Marjoribanks (1970) investigated the relative relationship between process variables, and status variables, to four well-established Thurstone's PMAs of Verbal, Number, Reasoning, and Spatial abilities. The subjects under study were Grade 5 boys sampled from five Canadian ethnic groups. Focusing on those process variables which previous research findings (Vernon, op cit; Bing, 1963; Ferguson & Maccoby, 1966; Witkin et al, 1962) had shown to relate to his four abilities of interest, he selected eight process variables for investigation, namely, Press for School-achievement, Press for Activeness, Press for Intellectuality, Press for Independence, Press for English, Press for Ethlan-

guage, Father's Dominance and Mother's Dominance. Six standard status variables - Education of Father, Education of Mother, Occupation of Father, Number of Children in Family, Crowding Ratio, and Ordinal Position in Family, were selected for testing his hypothesis that process variables would contribute more substantially to the variation in scores on the ability tasks than the status variables. The findings confirmed this hypothesis.

Several other studies concerned primarily with familial process variables in their investigations on the link between home environmental circumstances and abilities. Drawing upon the process variables which previous researchers had underpinned as indicative of being more specifically linked to the differential abilities in the WISC battery, Mosychuk (1969) developed a Differential Environmental Process Variable Scale consisting of 10 process variables to examine the extent of their relationships to the WISC component abilities. The 'patterns' of his findings reiterated the trends in previous findings that:

- 1) Verbal abilities were highly correlated with Parental Academic and Vocational Aspirations, Parents' Knowledge of, and Interest in Child's Educational Development, Linguistic Background, Learning Materials in the Home, and a Secure, Planful, Purposeful Home;
- 2) Numerical and Reasoning abilities were linked with home exposure to rich and variegated visual and kinaesthetic stimuli, and encouragement of resourcefulness and initiative;
- 3) Spatial and Perceptual abilities correlated negatively with Female Dominance in upbringing.

Garber and Ware (1970) described the development of an instrument called the 'Home Environment Review' (HER), which was designed to serve two functions. The first being to examine the home characteristics which would be manipulable by educators and the second to measure variables which they considered to be more directly linked with school-achievement. The HER variables included: 1) Expectations for Child's Schooling, 2) Awareness of Child's Development, 3) Rewards for Intellectual Development, 4) Press for Language Development, 5) Availability and Use of Supplies for Language Development, 6) Learning Opportunities Outside the Home, 7) Materials for Learning in the Home, 8) Reading Press, and 9) Trust in School. Using stepwise multiple regression analysis on the nine HER components as predictors and scores on the Peabody Picture Vocabulary Test as criterion, Garber and Ware found that the two HER components which had significant bearing on the intelligence criterion were 'Expectations for the Child's School Success' and 'Learning Materials in the Home'.

Jones (1972) selected only those of Mosychuk's DEPVAR variables that gave evidence of a more definitive relationship with verbal ability and combined these with Bernstein's Mother Interaction Index in her measure of the home environment. She compared these home indices (Interaction Index, Toys Index, Communication Index, Academic and Vocational Aspiration, Knowledge of Child's Academic Development and Material Opportunities for Language Development) for two samples of Grade 5 Canadian boys who represented the two extremities of the verbal continuum in a group tested on the WISC verbal ability tests. Her t-test

results on the significant cross-group differences in means for each of the home indices showed that high verbal scorers came from homes where parents had a higher verbal interaction index, high academic and vocational aspirations for the child, and had provided more opportunities for the development of language. High verbal scorers also had high occupational status. A stepwise regression analysis on the pooled sample brought out the variable, 'Opportunities for the use and development of language' as the best predictor of verbal ability.

As had been alluded to in the preceding chapter, the affective interpersonal variables associated with familial socialization processes have relevance to cognitive development in that they affect the child's inclinations to explore the environment and his reactions to stimulating experiences. The link between affective variables and abilities have been observed through child-rearing studies.

Findings seem to indicate that certain types of familial affectional relations, patterns of upbringing and types of home discipline are more favourable to the development of some abilities than others. Thus, the studies of Hurley (1965), Crites and Sembler (1967), and Bayley (1968) have shown that a home which promotes the child's feelings of worth, sense of belonging and self-reliance leads to better performance in widely-used tests of intelligence and school-achievement. Parent-child sharing and social interaction were found to relate to mental abilities in the studies of Hill (1967), and Pedersen and Wender (1968). Honzik (1967) reported that certain affectional relations within the family such as mother-son closeness and father's friendli-

ness towards daughters correlated with longitudinal change in intelligence scores. Bayley (1971) reported that school-age children with loving mothers tended to score highly on intelligence tests while their counterparts who had hostile rejecting mothers obtained considerably lower scores. Radin (1972) found significant correlations between maternal warmth and initial IQ and IQ gain in preschool, in his sample of lower-class preschool children.

Patterns of child-rearing practices and parental characteristics have also been shown to relate to differential abilities. Kent and Davis (1957) investigated the relationship between scores on Stanford-Binet IQ, and WISC Performance IQ and types of home discipline in a study of 118, 8-year-old English children. It may be deduced from their findings that children of demanding and over-anxious mothers scored better on Verbal IQ than on WISC performance.

Witkin et al (1962) in their attempts to uncover the antecedents of the field-dependence-independence dimension of psychological differentiation, a mode of intellectual or perceptual functioning characterized by an analytical way of perceiving stimuli, discovered that authoritarian mothers who imposed severe standards of discipline, and stressed conformity negate differentiation but might foster the development of verbal abilities. The field-dependence-independence dimension may be assessed through the Embedded Figures Test (EFT), a test which often loads on the Flexibility of Closure primary ability-factor (Horn, 1972; p. 466).

In their series of studies on mother-child interactions (Witkin

et al, 1962; Dyk & Witkin, 1965; Witkin, 1967) they had managed to uncover patterns of child-rearing practices which relate to the field dependence-independence dimension. Three major parameters with their corresponding indicators interpreted as facilitating differentiation were: 1) Training for Independence as exhibited by mother's adoption of physical care appropriate to child's age, mother encouraging child to assume adequate responsibilities and activities, and mother stimulating child's curiosity and interests; 2) Training for Control of Aggressive, Assertive Behaviour as indicated by mother using reasoning and explanation in disciplining, and maternal consistency in behaviour; and 3) Mother's Personal Characteristics as indicated by having assurance in her own competence in raising the child (Witkin et al, 1967; p. 237).

In summing, the familial psychosocial variables which have been investigated in terms of their links with abilities, may be classified into three broad categories of affective, process, and status variables. The abilities examined were usually omnibus tests of intelligence, such as the WISC, Lorge-Thorndike, Stanford Binet, or Thurstone's four extensively-used PMAs of Verbal, Number, Reasoning, and Spatial, or school-achievement. The only study using factor-analytic ability-factors was Vernon's, though an attempt was made at it in Mosychuk's study. Short of the factor-analytic criterion of an ability-factor, the abilities examined in the studies cited in this section may be viewed broadly as verbal abilities, non-verbal abilities and school-achievement.

Consistencies in findings across studies show that there is a clear link between the verbal abilities and these familial psychosocial variables, such as 'Occurrence of parent-child verbal interaction', 'Provisions of opportunities for language development', 'Parental educational and occupational status', 'Authoritarian mothers', 'Dependency-fostering and overprotection' and 'Maternal warmth and love', and 'Learning materials in the home'. Non-verbal abilities, as represented by spatial, perceptual abilities, tended to relate to 'Exposure to rich and variegated visual and kinaesthetic experiences', 'Self-reliance', 'Encouragement of initiative and resourcefulness', 'Adult models' and 'Planfulness in the home, and 'Maternal justification of discipline'. Furthermore there is evidence that non-verbal abilities as characterized by Spatial and Perceptual abilities, have a weaker association with familial psychosocial circumstances. School-achievement related generally to 'Parental educational and occupational status', 'Material wealth', 'Maternal warmth and love', and the whole array of process variables which had originated from the Chicago technology of environmental measurement.

Summary

The preceding review presents the theoretical basis for, and findings to date on the relation of familial psychosocial circumstances to mental abilities.

Theory substantiated by research findings has demonstrated the fruitful results of identifying dimensions underlying mental tests, namely, ability-factors. This process of dimension-identification has

led to meaningful psychological descriptions of clusters of cognitive tasks and their links with developmental 'factors' such as learning and environmental circumstances.

Different factoring procedures can bring out different models of viewing the clustering of tests, but the hierarchical model has been shown to have conceptual links with learning principles and developmental theories of cognition. Currently, the hierarchical model is a more preferred model for viewing abilities. There is a general consensus among psychometrists on the possible causes for the emergence of factor-analytic abilities. The generally accepted causes are prerequisite learning, transfer of training, and cultural and educational experiences.

Though there is considerable theoretical convergence on the important role of experiential differences in influencing the development of abilities, this theoretical consideration provides no elucidation on what constitutes favourable environmental conditions or what environmental characteristics favour the formation of what types of abilities. It follows therefore that identification of environmental conditions associated with the emergence of ability-factors will have to be approached empirically. Cumulative learning models of abilities coupled with the fact that the home is the child's first encounter with the environment makes it logical for attention to be given to home environmental experiences.

Studies on group differences in ability patterning both among subgroups within Euro-American cultures and among cross-cultural groups

have shown that ability-factors underlying the same battery of tests may vary across groups differing in environmental experiences, such as schooling, socioeconomic status, cultural and ecological backgrounds. On the other hand, the elementary common ability-factors appear to be relatively stable among school subjects both within Euro-American cultures and across diverse cultures. An important feature brought out in cross-group comparisons of ability patterning is that the same test may not be measuring the same ability-factor in different groups.

Most of the studies examining the association between abilities and familial psychosocial circumstances used omnibus tests of intelligence or subscales from batteries of general intelligence, and tests of school-achievement. With the exception of Vernon's isolated attempt to adhere to the factor-analytic concept of abilities, the majority of studies used either single test scores or composite scores on a group of tests as ability measures. This gives rise to a missing link in the empirical relation of familial psychosocial circumstances to abilities conceived in factor-analytic terms, and presents a weak basis for clear-cut generalizations on the relation of abilities to familial psychosocial circumstances.

The familial psychosocial variables studied, generally fell into three broad categories of affective, process, and status variables. Though variations occurred across studies in the naming of these variables within categories, examination of specific behavioural characteristics defining the variables showed that the frequently studied variables within each category were:

Affective variables: Maternal warmth and love, parent-child closeness and social interactions, female dominance in child upbringing, and types of home discipline.

Process variables: Press for school-achievement, activeness in family, intellectuality in the home, availability of a variety of learning materials, model identification, occurrence of parent-child verbal interaction of an informative nature, self-reliance, exposure to rich and variegated visual and kinaesthetic experiences and planfulness in the home.

Status variables: Material possessions in the home, parental education and occupation, linguistic background, family size, family income, family structure, and dwelling-place.

Several general consistencies among findings have emerged. Generally, the familial psychosocial variables listed above had been shown to exhibit varying degrees of association with one ability or another. The trends in the findings point to a differential relationship between familial psychosocial circumstances and abilities. Thus, verbal abilities relate substantially to variables, such as "High degree of parent-child verbal interaction", 'Parental aspirations for child's education', 'Provisions of opportunities for language development', 'Parental educational and occupational status', 'Authoritarian mothers', 'Dependency-fostering and overprotection', and 'Maternal warmth and love'. Non-verbal abilities, as represented by Spatial, Perceptual and Numerical abilities tended to relate to 'Planfulness in the home', 'Exposure to rich and variegated visual and kinaesthetic experiences',

'Self-reliance', 'Adult models', and 'Encouragement of resourcefulness and initiative'. Finally, school-achievement has been found to relate to the same familial psychosocial variables in much the same way as the verbal abilities. Where comparisons had been made within studies, findings usually point to a stronger link for process variables to abilities, than for status to abilities. However, most of these findings occurred in studies on Euro-American children in the preschool or early school periods, for whom the home and school mutually reinforce each other in fostering these abilities.

In conclusion, there is theoretical justification for the study of the relations of familial psychosocial circumstances to ability-factors. Investigations into the relations of familial psychosocial circumstances to ability-factors have delineated groups of familial psychosocial variables which are consistently linked to certain loosely-defined ability-factors. Though psychometrists have often underscored the part played by schooling in fostering ability-factors other than g, studies to date have given little consideration to the role of varying interplay between the home and school.

In the light of what has emerged from the preceding review, this study attempts to establish some elementary common ability-factors across the Chinese and Malay groups in Singapore, and to examine how these abilities relate to familial psychosocial circumstances which have been identified as important correlates of similar abilities for Euro-American subjects.

CHAPTER III

DEFINITIONS, THEORETICAL RATIONALE, AND HYPOTHESES

Definitions

The following definitions of terms are presented to indicate their specific connotations within the context of this study.

Affective variables refer to the emotive-experiential accompaniments of parent-child interactional processes that are likely to affect the child's inclinations to explore the 'physical, interpersonal, and ideational aspects of the environment' (Hurley, 1965; p. 19), such as warmth, hostility and affection.

Process variables represent the more dynamic and purposeful interactions between parent and child that bear directly on the cognitive development of the latter, such as 'Parental Aspirations for Child's Education', 'Direct Teaching Activities', 'Educational Activities' and 'Encouragement for Activeness'.

Status variables represent the more tangible aspects of the home, such as family structure, or socioeconomic indicants like parental occupation, amount and quality of modern appliances, and other similar forms of material wealth.

Psychosocial variables refer to the generic term which subsumes the affective, process, and status variables.

Domain refers to a broad representative sample of variables - if the constituent variables are cognitive tests, then it is an ability domain, if the constituent variables comprise affective variables, then

it is an affective domain, and so on for the process and status variables.

Factor relates to a cluster of variables that emerges from a factor analysis of a domain of variables. Thus an ability-factor would be a cluster of cognitive tests resulting from the factoring of a domain of such tests, and an affective-factor would be a cluster of affective variables resulting from the factoring of an affective domain, and the same applies for process and status domains. The same term in quotation marks refers to common usage of the word. The word ability is also used synonymously with ability-factor.

Elementary abilities are first-order factors arising from the factoring of a domain of tests, and defined by two or more tests measuring the same specific skill (Horn, 1975). They represent the elementary common factors described by Horn (Horn, 1972; p. 498).

Culture refers to the anthropological concept of the term - the social mores, values and attitudes, and 'patterns' of interpersonal behaviours as practised by a group of individuals.

Theoretical Rationale

Studies on group differences in patterning of abilities have shown that the same test may not measure the same ability-factor. Ability-factors underlying the same battery of tests may vary across groups differing in environmental experiences, such as schooling, socioeconomic status, and cultural and ecological backgrounds. With school subjects, the stability of the elementary common ability-factors (Horn, 1972; p. 498) have been relatively established both within Euro-American

cultures and across other cultural milieus.

Taking cognizance of the above features of tests and ability-factors, this study is organized in terms of two purposes:

1. a) to investigate the patterns in a domain of school-related ability-factors across two samples of Singapore Chinese and Malay 14-year-old male pupils and b), c), d) to similarly examine factor patterns in affective, process, and status domains of familial circumstances; and
2. to examine the relation of the ability-factors to familial psychosocial circumstances with particular reference to those which have been consistently identified as important correlates of the abilities in Euro-American context.

The main aim underlying purpose 2 is to test the generalizability of Euro-American trends in findings on the relation of familial psychosocial circumstances to abilities, to other cultural groups for whom the interplay between the home and school in fostering these abilities varies from Euro-American cultures.

Some of the studies cited in the foregoing review (Filella, 1960; Dockrell, 1966; Vernon, 1969), and the arguments presented in Chapter I suggest that differences in schooling, social class membership and varying interplay between the home and school may result in various 'patterns' of relationships between familial psychosocial circumstances and abilities. To ascertain that group differences on the relation of familial psychosocial circumstances to abilities reflect only variations due to interplay between the home and school, the subjects for

this study were drawn from the Singapore Chinese and Malay pupils with similar educational exposure and socioeconomic class. Variations in the interplay between the home and school for these groups exist along the following directions. Members of both groups differ from Euro-American subjects in that for them schooling plays a compensatory role, while for Euro-American subjects schooling plays a reinforcing role. Among the Chinese and Malay samples, variation occurs to the extent that schooling effects can offset the effects of the home in that the Chinese pupil would tend to respond more positively to schooling because of traditional respect for intellectual strivings, the Chinese habits of persistence in work, and strong motivation, while the Malay pupil with his easy going outlook on life in general may be indifferent to schooling (Hunter, 1966; Wilson, 1967). This difference between the two groups in their response to schooling is reflected in the fact that in spite of equal educational facilities and opportunities, the Chinese subjects appear to be better school-achievers.

In keeping with the first purpose of this study an ability domain is to be conceived of as a broad representative sample of abilities comprising the more stable elementary common ability-factors (Royce, 1973; p. 314) and which are closely associated with measures of intelligence (Horn, 1972; p.483) and the three most important subjects in the Singapore school curriculum, namely, Reading, Mathematics and Science. Consistent findings on the stability of elementary common ability-factors (Hakstian & Cattell, 1974; Horn, 1975) indicate that the composition of such an ability domain could be reproduced from an input

battery of carefully selected tests. Thus the input elementary ability-factors for this study represent the Verbal Reasoning, Induction, Number Facility, Space + Visualization, Flexibility of Closure, Speed of Closure, and School-achievement abilities.

Euro-American research has shown that abilities may relate to familial psychosocial circumstances in three domains characterized by affective, process, and status variables. However, the trend in findings has been in the direction of a stronger link between the process domain and abilities. Because the school also plays a part in fostering these abilities, it is possible that the relation of familial psychosocial circumstances to abilities would depend on the relative contribution of the home and the school in fashioning these abilities.

It is apparent that of the three domains of familial psychosocial variables, the process domain matches the teaching processes in school and hence are more susceptible to counter-balancing effects of schooling. Considered from this point of view, in cultures where schooling plays a dominant role in enhancing the development of these abilities, the link between the process domain and school-related ability-factors may not be as strong as has been demonstrated with Euro-American subjects for whom the home and the school are reinforcing institutions. Justification for the more probable stronger link between abilities and the status domain or affective domain, in cultures where schooling plays a compensatory role, has been alluded to in Chapter I.

In the light of the above discussions the factors underlying the selected ability, affective, process, and status domains, in this study

are to be investigated for the Chinese and Malay groups separately. The relations of the generated common ability-factors are then to be examined with reference to the factors underlying the affective, process, and status variables, which are being described under instrumentation.

Hypotheses

Within-ability Domain. The stability of elementary common ability factors have been well-established with Euro-American subjects and non-Euro-American subjects who have been exposed to comparable Euro-American educational treatment and acculturation. The Chinese and Malay samples in this study are of comparable social backgrounds and have been inducted into a uniform system of Euro-American evolved-type of schooling. It is likely that they will exhibit similar ability patterns and the nature of the ability-factors will be similar to the input ability-factors which have been selected on the basis of Euro-American definitional norms. To test the reproducibility of these Euro-American ability-factors in the Chinese and Malay ability patterns, the following hypothesis is proposed for examination.

1. The emergent first-order ability-factors in both the Chinese and Malay ability patterns will resemble the input elementary ability-factors.

The Chinese pupil because of his strong motivation to achieve school success and traditional habitual diligence, tends to stretch his school-achievement further to his capacities than would his more easy going Malay counterpart. In terms of Ferguson's theoretical viewpoint

on the differentiation of ability-factors, the School-achievement factor in the Chinese ability pattern will exhibit sharper differentiation from the other within-Chinese ability-factors than the Malay School-achievement factor will in the Malay ability pattern. To test this, the following hypothesis is presented for investigation.

2. The Chinese School-achievement factor will exhibit sharper differentiation from all the other ability-factors in the within-Chinese-pattern than the Malay School-achievement factor will in the within-Malay-pattern.

Within-psychosocial Domains. Many of the studies covered in this review have shown the tendency of some familial psychosocial variables to operate differently in different social groups because of differences in deep-seated social values and attitudes. It is likely that because of the Chinese and Malays' socio-cultural historical differences the same phenomenon may exist among the familial psychosocial variables across these two ethnic groups. To test whether this may be the case, the following hypothesis is proposed for study.

3. The variables within each of the three psychosocial domains will pattern differently in the Chinese and Malay samples. From the information available, however, there seems to be little basis on which to predict specifically how the patterns may differ.

Between Ability Domain and Each Psychosocial Domain. Relative to the status domain, the process domain has been consistently shown to

exhibit a stronger linkage with abilities in Euro-American setting. Arguments have been presented in the preceding discussions that for groups where schooling plays a relatively compensatory role in fashioning the abilities, the same characteristic of the process variables may not show out in the relation of familial psychosocial circumstances to abilities. To examine whether there is empirical validity for such arguments the following hypothesis is advanced.

4. Relative to the affective and status domains, the process domain will exhibit a stronger link with the Verbal Reasoning and School-achievement factors if hypothesis 1 holds.

CHAPTER IV

SAMPLES AND SAMPLING

Samples

The two major ethnic groups in Singapore, of Chinese and Malay origins, having been brought under a uniform system of Euro-American-evolved type of schooling, served as subjects for this study.

Family structure and socialization 'patterns' as they pertain to these subjects differ considerably from Euro-American norms. Most Singapore families comprise, in addition to the Euro-American nuclear family, older relatives who contribute not only to the material wealth of the family but also provide some kind of compensatory or complementary parental functions which can balance out the inadequate parental care that would exist in large nuclear families. Furthermore, the eldest child or other older children very often have to share the parental responsibility of looking after the younger siblings while the youngest child is usually showered with all the brotherly and sisterly affection and encouragement in addition to those of the parents. Parents who come from the lower occupational status group themselves, may have some relatives or older children with considerably higher educational level and occupational status. Such members in the family may act as some sort of identity figure to the child and hence exert some influence on him. Thus, the Singapore Chinese or Malay child's 'pattern' of family-interactions is diffused and distributed among this wide circle of family members, unlike that of his Euro-American counter-

part, whose family-interactions tend to centre around the nuclear family unit.

Considerable differences existed in the ecology and culture of these two ethnic groups in pre-independent Singapore days. The Chinese by virtue of their more urban-centred occupations such as commerce, the professions and retail trades had an urban-oriented culture. Their values and habits were more urban-oriented than their Malay counterparts. The latter's common occupations were fishing, gardening, the police force and marine-related works, such as sailors or seamen. The nature of these occupations led the Malays to move to the 'rural' parts of Singapore or the neighbouring small islands. They lived in kampongs which consisted of clusters of varying numbers of wooden bungalow houses, where Malay families related through kinships lived. Most Malay social activities were transacted within each kampong community. The Malay child's vision of the world lay within the confines of this community. In this respect it is recognizable that the Malay child would tend to have a rural-oriented vista as against the city-oriented vista of his Chinese counterparts. Few Malay children attended formal schooling, the majority of them just received some religious instruction in Islam (the Malay religion) at a nearby religious school or at the residence of a guru (Malay term for a teacher) who usually resided within the same kampong.

Nearly every Malay is a Muslim (a believer in Islam). To the Malays, Islam and the study of it is an "integral part of the life and being of a Malay" (Wilson, 1967; p. 64). The daily lives of the Malays

are to a large extent sanctioned by the teachings of Islam. In contrast the Chinese takes an eclectic approach to life in general. Thus, the Chinese are not restricted to any religion and regardless of their religious orientations, their realization of the economic value of an English education during the colonial era had led them to avail themselves of the educational facilities provided by the Christian missions. In contrast, the strong hold of Islam on the Malays led them to stay away from formal schooling which they viewed as a threat to their religion because of its affinity to Christianity.

The character of child upbringing among these two ethnic groups presented another dimension of cultural contrast. Chinese children were brought up strictly to respect parental or adult control. The Chinese had very strong traditional family relationships. Within each family, younger siblings had to demonstrate some respect to older siblings by addressing them by their proper older sibling terms and not their personal names. Older siblings in turn are expected to protect their younger sibs and to yield to them in quarrels over playthings. In addition it was the responsibility of older sibs to set a good example for younger members of the family. At a very young age the child was made to understand that adult control is an expression of their concern for him and he should appreciate it. Within this strong system of control, the Chinese child imbibed Chinese traditional habits of frugality, persistence in work, and esteem for education from their adult exemplars through observation and imitation with very little verbalization. Interdependence among family members was very strong

and it was the responsibility of every family member to uphold the family image. Thus, a child whose parents or older siblings had achieved high educational or occupational status felt it his responsibility to maintain at least that family position and this motivated him to strive for his best in school.

While the 'patterns' of family relationships and socialization processes within Malay families may be somewhat similar to those in Chinese families, they vary in degrees of control. Malay parents on the average tended to adopt a more indulgent approach in the upbringing of their children. In addition the Malays valued the less demanding rural way of life and consequently had adopted a laissez-faire attitude to life. Because of this they were more inclined to adopt a rather indifferent attitude to education and this was reflected in the upbringing of their children.

When Singapore became self-governing in 1965, a new system of education was evolved, which aimed to provide every Singapore child, regardless of race or religion, with the necessary skills for articulation with the nation's developing industrialization programs, while at the same time enabling each ethnic group to preserve its distinctive cultural heritage. Thus, education in Singapore now is available in the four official languages of the Republic, namely, Mandarin (the traditional Chinese official language), English, Malay (also Singapore's national language), and Tamil (the most common Indian dialect in Singapore). All these four language streams of education follow a common curriculum. It is compulsory for every Singapore school child to have

two school languages, with English as the lingua franca though not necessarily the main medium of instruction. Parents have the option to select the medium of instruction for their child. For most Chinese pupils, the mother tongue is not any of the school languages because the home language is often one of a number of Chinese dialects, the spoken versions of which are incomprehensible to a speaker of Mandarin and vice versa. Most of the Malay pupils on the other hand, have one of the two school languages as their home language.

Educational and employment opportunities in general revolve around the merit criterion. The educational system has an in-built competitive structure and the selection of candidates for jobs is often linked to their performance at the educational level appropriate to the job requirement. This intimate link between educational-achievement and economic success makes education highly valued in Singapore. Apparently the realization of such a link would raise the aspiration and achievement motivation levels of the Chinese with their eclectic outlook on life, more than the Malays with their more laissez-faire orientation towards life. This is saliently described in the quotation,

"...Chinese came from a society where education is esteemed and where the pressure of competition has been inordinately strong. They see clearly the link between formal education and personal economic success...and the habits of frugality, hard work and unquestioned parental control drive the Chinese pupil to the limits of his ability."
(Hunter, 1966; p. 44)

Sampling

The English-stream Secondary II pupils (equivalent of grade 8-9), ages between 13+ and 14+, from the integrated school system of Singapore formed the population from which samples were drawn. This age group was chosen for the reasons that theory has indicated that children at this age level have well-differentiated abilities and the fact that within the structure of Singapore's educational system, pupils at this grade level are sufficiently heterogeneous on mental abilities. Added to these is also the fact that these subjects' English Language proficiency would reduce errors in test-taking situations using English as the medium of administration.

Four integrated secondary schools servicing the children in four different geographical locations on the island of Singapore were selected. This was to ascertain that the subjects drawn would be heterogeneous on the psychosocial variables under investigation. The list of participating schools appears in Appendix IV. The Chinese and Malay male pupils in the Secondary II English-stream classes in these four schools were tested. The original plan was to randomly sample 200 of these pupils from each ethnic group but this fiscal year's available numbers in this category of pupils in these four schools turned out to be less than this number. Since the available number of 147 for the Chinese and 190 for the Malays, each relative to the number of selected instruments used fell within the commonly accepted range of 2:1 to 5:1 for the ratio of number of subjects to number of tests for factorial studies (Cattell, 1966; p. 236-237), it was decided to use these avail-

able sample sizes for the two groups. Heavy time constraints and the need to arrive at a workable testing schedule with minimum disruption of important school lessons, did not permit the more ideal sampling alternatives. Table 1 shows the descriptive data of the two samples.

The restriction to male pupils was for these reasons: - 1) getting results that could be compared with Euro-American data, 2) to resolve the problem of interpretation on the uncertainty over sex differences in mental abilities as a result of new evidence found in recent studies carried out with non-Euro-American groups (MacArthur, 1974b), and 3) this guiding statement by Vernon,

"Cause-effect relationships are on the whole more straightforward in the male sex. Girls seem to react more to the immediate social situation, hence it is more difficult to trace their present behaviour back to past experience."
(1969; p. 8)

TABLE 1. DESCRIPTIVE DATA OF
CHINESE AND MALAY SAMPLES

Ethnic Group	Chinese	Malays
Number of Subjects	147	190
Sex	Male	Male
Type of School	Integrated	Integrated
Number of years in School	7+	7+
Mean Age	13 yrs. 8 mths.	13 yrs. 10 mths.
Raven Progressive Matrices Mean Score (S.D.)	47.90 (5.11)	41.51 (8.49)
Father's Occupation, Mean (S.D.)	3.63 (1.33)	3.20 (1.09)
Father's Education, Mean (S.D.)	2.35 (0.83)	2.39 (0.92)
Mother's Occupation, Mean (S.D.)	1.21 (0.57)	1.16 (0.55)
Mother's Education, Mean (S.D.)	1.67 (0.92)	1.46 (0.79)
Material Wealth, Mean (S.D.)	3.89 (1.44)	3.49 (1.21)

CHAPTER V

INSTRUMENTATION AND PILOT TESTING

It was decided to collect data on the psychosocial variables from the subjects themselves in contrast to the usual method of getting information from the mothers. This was considered a legitimate way for the reason that essential consideration must be accorded to the vital role of the child's perspective because it is his interpretation of the attribution of intent that would have an impact on his cognition. An additional support for this approach was the subjects' capability to give reliable responses to the questions in the context of the mechanics of administration.

Instrumentation

An abundance of empirical evidence existed for supporting the selection of valid familial psychosocial variables that are important for cognitive development in Euro-American settings, but there is scarcity of empirical reference materials in this domain for the cultural backgrounds of the subjects in this study. However, an examination of the conceptual rationale in Euro-American studies (cf test rationale, Schwarz & Krug, 1972) for the selection of important psychosocial variables in influencing particular abilities, showed that similar basic constructs of the kinds identified in Euro-American familial environments do prevail in the home environments of the subjects in this study.

For the purpose of investigating whether evidence of these Euro-American constructs in the home environments of the present subjects

would exhibit similar trends of relationship with school-related skills, the following psychosocial variables within each domain of affective, process, and status variables were selected.

Affective Domain. Research and theory in child development have indicated that parental behaviours (more commonly maternal) in child-rearing can arouse feelings in the child in a way that would influence his cognitive development, as has been discussed in the preceding review. An examination of the types of parental behaviours that have been studied in relation to abilities (e.g. those cited in the review) showed that these were generally compatible with the 18 discrete components of parental behaviour sampled in the revised version of Schaefer's Children's Reports of Parental Behaviour Inventory (CRPBI) (Schaefer, 1965). This revised version of the CRPBI was 'developed from item and factor analyses of the initial version' (Renson et al, 1965; p. 2). Each of the 18 discrete components of parental behaviour (scales of the CRPBI) is described by either 8 or 16 items, selected on the basis of high predicted item variability, high predicted item-scale correlation, applicability of the item to both maternal and paternal behaviour, and results of factor loadings on the isolated factors. Internal-consistency reliabilities for the scales ranged from .55 to .86, using normal boys as subjects. The items are statements describing 'concrete, specific, and easily observable parent behaviours'. In answering the statements, the subject has to read each of them at a time and then indicate whether it is Like, Somewhat Like, or Not Like his parents' behaviour by circling the appropriate one. Items are

scored with Like having a score of 3, Somewhat Like 2, and Not Like 1. There are separate but identical forms for mother and father. Schaefer (op cit) had isolated three factors of Acceptance vs Rejection, Psychological Control, and Lax vs Firm Control underlying the 18 scales of the CRPBI using American subjects. Renson (cited in Renson et al, op cit) had administered a translated French form of the CRPBI to 182 French-speaking (Walloon) public high school students in Belgium and obtained three equivalent factors, using the judgmental criterion of high scale loadings. Renson's findings suggest that there may be cross-cultural validity for the CRPBI.

The CRPBI components of parental behaviour were also found to represent a comprehensive sample of characteristic behaviours of Singapore parents in the upbringing of their children. The method of assessing these components through children's report of retrospective perception of specific parental behaviours matched this study's approach of assessing psychosocial variables from the child's attribution of intent. Both these considerations led to the selection of the CRPBI scales of parent behaviour as affective variables for this study. These scales (Appendix III shows their item descriptions) together with their expected underlying factors are presented for reference here:

Factors	Affective Variables (CRPBI Scales)
1) Acceptance vs Rejection	1.1 Acceptance of Individuation
	1.2 Acceptance
	1.3 Positive Involvement
	1.4 Childcentredness
	1.5 Possessiveness
	1.6 Intrusiveness

- 2) Psychological Control
 - 2.1 Control through guilt
 - 2.2 Hostile control
 - 2.3 Control through instilling persistent anxiety
 - 2.4 Control through withdrawal of relationships
 - 2.5 Rejection
 - 2.6 Hostile detachment
- 3) Lax vs Firm Control
 - 3.1 Inconsistent discipline
 - 3.2 Nonenforcement
 - 3.3 Extreme autonomy
 - 3.4 Lax discipline
 - 3.5 Control
 - 3.6 Enforcement

Process Domain. The identification of these variables followed the Chicago methodology (Wolf, 1964b). The variables were arrived at through a comparative study of items in the Dyer (1967), Mosychuk (1969), Marjoribanks (1970), and MacArthur (personal communication) interview schedules, and guidance from developmental psychology. The list included the first six of Marjoribank's press variables and two of MacArthur's process variables, interpreted in terms of local descriptive characteristics. Below is the list of variable names, followed by their corresponding environmental characteristics:

<u>Process Variables</u>	<u>Characteristics</u>
1) Press for School-achievement	<ul style="list-style-type: none"> 1.1 Parental aspirations for the education of the child. 1.2 Preparation and planning for child's education 1.3 Parental interest in child's educational progress

- | | |
|------------------------------|---|
| 2) Press for Activeness | 2.1 Extent and content of indoor activities |
| | 2.2 Extent and content of outdoor activities |
| | 2.3 Extent and purpose of the use of T.V. and other media |
| 3) Press for Intellectuality | 3.1 Number of thought provoking activities engaged in by child |
| | 3.2 Opportunities made available for thought provoking discussions and thinking |
| | 3.3 Use of books, periodicals and other related literature |
| 4) Press for Independence | 4.1 Freedom and encouragement to explore the environment |
| | 4.2 Stress on early independence |
| 5) Press for English | 5.1 Language usage and reinforcement |
| | 5.2 Opportunities available for language usage |
| 6) Press for Ethlanguage | 6.1 Ethlanguage usage and reinforcement |
| | 6.2 Opportunities available for ethlanguage usage |
| 7) Model Identification | 7.1 Identification with models who have successful careers |
| | 7.2 Identification with models with high educational achievements |
| | 7.3 Identification with models for their extensive knowledge |
| 8) Planfulness in Family | 8.1 Planning in major family duties |
| | 8.2 Punctuality in carrying out plans |
| | 8.3 Delayed gratification |

Status Domain. The variables in this domain included those which have been consistently identified as correlates of abilities in Euro-American culture as well as the local variables which are closely

associated with these (see Section on Samples).

- Status Variables -
- 1) Family size
 - 2) Family structure
 - 3) Father's occupation
 - 4) Father's education
 - 5) Mother's occupation
 - 6) Mother's education
 - 7) Home induction to school instructional languages
 - 8) Type of house
 - 9) Material wealth in the home
 - 10) Education of siblings
 - 11) Educational level of highest wage earner, not parents
 - 12) Occupational status of highest wage earner, not parents

A semi-structured questionnaire named Home Environment Questionnaire (HEQ) was developed to obtain data on the process and status variables.

Pilot Testing

A pilot testing on the HEQ and the revised version of the Schaefer CRPBI was carried out with a sample of subjects equivalent to those who were to be subjects for the final study. To minimize the test-taking demands on the subjects and in keeping with Euro-American trends in using maternal data, it was decided to pilot test on the mother form of the revised version of the Schaefer CRPBI. Pilot testing was carried out with pupils in schools other than the four selected for the main study (Appendix IV). The instruments were administered by the writer personally to the subjects in their classrooms, class by class (each class size averaging 35). This method was adopted in all

the testing sessions for two reasons, 1) to minimize the inconvenience to teachers and the disruption of lessons, and hence establish good rapport with school administrators, and 2) better pupil cooperation could be achieved when pupils saw that everyone in the class was involved. In total, 180 pupils were tested.

Treatment of HEQ pilot data. The pilot data were examined to detect any ambiguity in the phraseologies of questions and alternative responses provided. This was done in the light of cues resulting from the questions subjects raised during the HEQ-taking sessions. As a result of this analysis, slight changes were made in the starting lists of process variables and status variables, and some of the questions in the original version of the HEQ. The final form given to the actual subjects in the main study appears under Appendix I.

In the case of questions (22-65) on the process variables, those having 'Other Answer' responses were included for sorting out the data into more general categories like the response categories for each item in the Rating Scale (Appendix II). After this categorization had been done, a set of items together with their corresponding response categories belonging to two of the variables (all the status variables were given as one set) were given to a different group of three teacher-judges each. The judges were told to rate the response categories to each item or combinations of sub-items (re Rating Scale, Appendix II) on a 7-point scale in terms of their relationship to school-achievement. The writer also rated these response categories independently before obtaining the returns from the judges. The Rating Scale

(Appendix II) was developed out of the average ratings (rounded to the next highest integer) of the judges on each of the response categories.

There was almost perfect judges' agreement on the ratings of the response categories to the status questions for the 'Planfulness in the Family' and 'Model Identification' process variables. In the case of the response categories to the 'Press for School-achievement', 'Press for Activeness', 'Press for Intellectuality', 'Press for Independence', and 'Press for English' process variables, the reliability of judges' ratings was not that evident. To check on this, the reliability of rating on the response categories by the judges was estimated separately for each of these five variables, using the one-factor analysis of variance for repeated measures, the formula of which is:

$$\text{Reliability of judges' rating, } r_j = \frac{k\hat{\theta}'}{1+k\hat{\theta}'}$$

$$\text{where } \hat{\theta}' = \frac{MS_{\text{bet response categories}} - mMS_{\text{w response categories}}}{mkMS_{\text{w response categories}}}$$

and k = number of judges, n = no. of response categories

$$m = \frac{n(k-1)}{n(k-1)-2}$$

(Winer, 1971; p. 288)

The values of r_j for each of these variables are shown in Table 1.

TABLE 2
RELIABILITY OF JUDGES' RATINGS
ON FIVE PROCESS VARIABLES

Process Variables	Reliability
Press for School-achievement	.95
Press for Activeness	.96
Press for Intellectuality	.93
Press for Independence	.90
Press for English	.90

To check on the reliability of the whole HEQ instrument, a random sample of 40 subjects was selected from the subjects who took the instrument and r was computed on the responses of these 40 cases using the same design as above but the terms were interpreted as:

$$\hat{\theta}' = \frac{MS_{\text{bet persons}} - mMS_w \text{ persons}}{mkMS_w \text{ persons}}$$

k = number of items

n = no. of people

(Winer, 1971; p. 284-287)

The value for the reliability of the items, r was found to be .87 in this case. Thus HEQ was found to have satisfactory reliability of measurement.

Treatment of CRPBI (Mother Form) Data. This piloting exercise was done to obtain some preliminary feel on the subjects' reactions to the phraseology and format of the instrument. The other purpose of this piloting was to enable the writer to arrive at an appropriate way of administering the instrument to subjects in the main study. From the experience gained in this piloting it was confirmed that the

original plan to read out each statement and let the subjects follow silently was a better approach than the Schaefer method of allowing them to read on their own. Thus this was made the standard administrative procedure for the subjects in the main study. No change was made in the items as a result of information obtained during the CRPBI-taking sessions.

CHAPTER VI

PSYCHOSOCIAL MEASURES, ABILITY MEASURES AND ADMINISTRATIVE PROCEDURES

Measures in the Psychosocial Variable Domains

Arising from the pilot data analyses, these psychosocial variables were finally included in each of the three domains of affective, process and status variables. The HEQ question number(s) corresponding to each process variable and status variable are given beside each variable in brackets below while the CRPBI items describing each of the affective variables are given in Appendix III.

- Affective Domain -
- 1) Acceptance of individuation
 - 2) Acceptance
 - 3) Positive involvement
 - 4) Childcentredness
 - 5) Possessiveness
 - 6) Intrusiveness
 - 7) Control through guilt
 - 8) Hostile control
 - 9) Control through instilling persistent anxiety
 - 10) Control through withdrawal of relationships
 - 11) Rejection
 - 12) Hostile detachment
 - 13) Inconsistent discipline
 - 14) Nonenforcement
 - 15) Extreme autonomy
 - 16) Lax discipline
 - 17) Control
 - 18) Enforcement

- Process Domain -
- 1) Press for School-achievement (Q22-29)
 - 2) Press for Activeness (Q30-35)
 - 3) Press for Intellectuality (Q36-41)
 - 4) Press for Independence (Q42-48)
 - 5) Model Identification (Q49-52)
 - 6) Planfulness in Family (Q53-58)
 - 7) Press for English (Q59-65)
- Status Domain -
- 1) Number of Siblings (Q1-2)
 - 2) Father's Occupation (Q3)
 - 3) Father's Education (Q4)
 - 4) Mother's Occupation (Q5)
 - 5) Mother's Education (Q6)
 - 6) Home Induction to School Instructional Languages (Q7)
 - 7) Type of House (Q8-11)
 - 8) Material Wealth (Q12-18)
 - 9) Highest Educational Level of Sibling (Q19)
 - 10) Educational Level of Highest Wage Earner, Not Parents (Q20-21)
 - 11) Occupational Status of Highest Wage Earner, Not Parents (Q20-21)

Measures in the Ability Domain

Following the theoretical rationale discussed in Chapter III, a battery of tests was selected to define the predicted ability-factors on the basis of Euro-American data. Other criteria that guided the selection of these tests in the ability domain were: 1) the available published tests on these skills should meet the constraints of the testing mechanics, in this instance, they had to be group administered, 2) the attributes of the subjects in this study, such as their age, grade level and proficiency in English, and 3) tests that had already been tested with the Singapore school population, as in the case of

AH4, Raven's Standard Progressive Matrices, and Cube Comparisons Test. The school-achievement tests were selected in consultation with teachers who were knowledgeable in these school subjects and who had taught these grade levels in Singapore.

The tests together with their psychometric properties (whenever available) are briefly described below. Sample items of these tests appear in Appendix IX. The first 12 tests come from the French, Ekstrom, and Price (FEP) Kit of Reference Tests for Cognitive Factors (1963). French et al prepared this kit of selected tests to measure the 24 elementary ability-factors (by the definition of this study), which they inferred from their extensive review of 124 studies (French et al; 1963) to be relatively established.

1. Hidden Figures Test - This is one of the FEP kit tests, defining the factor Flexibility of Closure (Cf). It is a modification of Thurstone's original Gottschaldt Figures Test. It requires the subject to decide which of 5 geometrical figures is embedded in a complex pattern. The total test-taking time is 20 minutes, a time of 10 minutes for each of 2 parts.
2. Hidden Patterns Test - This is another FEP kit test and belongs to the same factor as the above test. It requires the subject to mark the outline of a given configuration in the 10 given geometrical 'patterns' in each item whenever the configuration occurs. The test consists of 2 parts, each requiring a test-taking time of 2 minutes.
3. Gestalt Completion Test - This is a FEP reference test for the factor, Speed of Closure (Cs). The test requires the subject to write

down the names of objects given in the form of disjointed drawings. Total test-taking time is 6 minutes, i.e. 3 minutes for each of the 2 parts.

4. Concealed Words Test - This test defines the same factor as test 3 above in the FEP kit. In this test words are given with disjointed letters. The subject's task is to write out the full words. Total test-taking time is 6 minutes, i.e. 3 minutes for each of two parts.

5. Letter Sets Test - This is a FEP reference test for the Induction (I) factor. It consists of items, each having 5 sets of 4 letters. The subject's task is to find the rule which relates 4 of the sets and mark the odd one in the fifth set. The test consists of 2 parts, each part being given a test-taking time of 7 minutes.

6. Figure Classification - This test belongs to the same FEP factor as test 5. Each of its items consists of 2 rows, the first of which presents 2 or 3 groups of geometrical figures which are alike according to some rules to be discovered by the subject. The second row of the item consists of another set of geometrical figures for the subject to assign to each of the groups in row 1 according to the discovered rule. The test consists of 2 parts, each part requiring a test-taking time of 8 minutes.

7. Addition Test - This is one of the reference tests for the FEP factor, Number Facility (N). It is a speeded test of addition of sets of three 1- or 2-digit numbers. It has 2 parts, each requiring a test-taking time of 2 minutes.

8. Division Test - This test describes the same FEP factor as test 7.

It measures the subject's speed and accuracy in dividing 2- or 3-digit numbers by single digit numbers. The test has 2 parts, each part taking 2 minutes.

9. Subtraction & Multiplication Test - This also defines the same factor as tests 7 and 8. It measures the subject's speed and accuracy in alternately subtracting 2-digit numbers from 2-digit numbers and multiplying 2-digit numbers by single digit numbers. The test has 2 parts, each requiring 2 minutes of test-taking time.
10. Card Rotation Test - This is a reference test for the FEP factor, Spatial Orientation (S). Each of its items consists of a drawing of an irregularly shaped card on the left of a vertical line and 8 other irregularly shaped cards on the right of the same line. The subject's task is to identify which of the 8 cards is the same or different from the reference card on the left side of the vertical line. The total test-taking time is 8 minutes for 2 parts, with 4 minutes for each part.
11. Cube Comparisons Test - This test also belongs to the FEP kit and describes the same factor as test 10. Each of its test item consists of 2 drawings of a cube, the faces of which are marked by different capital letters. The subject is required to indicate whether the drawings in each item are of the same or different cube(s). Total test-taking time for the 2 parts of the test is 6 minutes, with 3 minutes for each part.
12. Form Board Test - This test defines the Visualization factor (Vz) in the FEP kit. Each of its test items consists of 5 shaded drawings of 2-D geometrical forms, some or all of which when put together can

form a given 2-D geometrical figure which is either a square, a triangle, a hexagon, or a cross. The subject's task is to indicate which of the drawings when fitted together will form the outline of the given geometrical figure. The test has two parts, each part requiring a test-taking time of 8 minutes.

The above 12 tests from the French et al Kit of Reference Tests for Cognitive Factors (op cit) have no information on the psychometric properties such as reliability, norming, and validity for these reasons:

"Such information has not been included because these tests are suggested for the single purpose of factorial research. It may be expected that the use of these tests will ordinarily cause the named factors to appear."

(French et al, 1963; p. 2)

13. Group Embedded Figures Test - This is one of the Witkin instruments for assessing the field-dependence-independence style of cognitive functioning. This test requires the subject to find a given simple form which is hidden in an obscure manner within a complex pattern. The test prevents the subject from seeing the reference simple form from the complex pattern simultaneously by having the whole set of 8 reference simple forms printed at the back of the test booklet, to which the subject may turn as frequently as he likes. The normative samples reported in the test manual were all less than 100 in size and were drawn from undergraduates. However, in this writer's opinion (based on testing experience with Singapore pupils), the subjects for this present study would have no difficulty in coping with the test items. Based on undergraduate subjects, the reported Spearman-Brown corrected correlation

between the two halves of the test was .82 for both sexes. Validity coefficients obtained with other measures of the Witkin battery as criterion variables showed that it correlated highest with the Individual Embedded Figures Test and least, with the Portable Rod and Frame Test, and moderately with the Witkin ABC test of body articulation for both sexes.

14. Raven Standard Progressive Matrices Test - This is a test which has been claimed to have a high g loading. It consists of a series of 60 items, perceptually presented. These 60 problems are classified into 5 sets of 12 each, named Set A, Set B,Set E in order of progressive complexity. Each set begins with a very simple problem, intended to be self-evident and to introduce the theme developed in it. The themes employed in the whole test, arranged in order of increasing complexity are A) Continuous Patterns, B) Analogies Between Pairs of Figures, C) Progressive Alterations of Patterns, D) Permutations of Figures, and E) Resolution of Figures into Constituent Parts. Each problem requires the testee to identify the logical relations between an incomplete matrix or pattern of 2-dimensional geometrical figures and then to select from a set of 6 or 8 figures that which would complete the matrix according to these relations.

It has been used extensively in cross-cultural studies and has been tested with Singapore samples for its adaptability for use with Singapore school population. The normative results from a sample of 12,600 secondary school pupils from 39 secondary schools in Singapore (Phua, 1971) led the investigator to conclude that the test could be

used with the Singapore school population without any adverse cultural disadvantage. The manual reported a test-retest reliability varying with age, the range of variation being .83-.93. Vernon (1961) in his study with 640 army recruits reported a K-R Formula 20 reliability of .85, and Banks and Sinha obtained a similar reliability of .91 in a study with 310 children in the age range of 8-13 years. A K-R formula 20 reliability of .88 had been obtained with Singapore subjects (Phua, op cit). The test manual also reported a validity coefficient of .86, using the Terman-Binet test as criterion.

Because each set in the test measures a different specific skill, and this specificity is quite compatible with the tasks in each test of the French et al kit, it was decided to treat each set separately as a discrete test in the test battery for factor analysis.

15. AH4 - This is a British omnibus test of general intelligence which the manual claims to be suitable for all children over 10 years of age. It consists of 2 parts, each part having 65 items and a test-taking time of 10 minutes.

Part I of the test has a verbal and numerical bias and measures 6 types of principles, namely, Directions, Verbal Opposites, Numerical Series, Verbal Analogies, Simple Arithmetic Computation, and Synonyms. Part II has a diagrammatic bias and includes these five principles - Analogies, Sames, Subtractions, Series and Superimpositions.

The subject is first introduced to the conventions of the questions and specificity of answers to each part through a practice exercise on the preliminary examples given, before he begins on the actual

questions in each part.

The manual reported a test-retest consistency for different groups of subjects to be generally over .90. The test correlated .65 with Raven Standard Progressive Matrices (1938) when carried out on British naval entrants. The manual claimed that test results generally showed significant agreement at the .005 level with examination results of British school children and University students. This test had also been tried out on another sample of Singapore secondary school pupils and the results though unreported, compared favourably with the normative data reported in the test manual.

For the same reasons stated in the Raven's Progressive Matrices test, each of the individual principles in AH4 was treated as an independent test variable in the test domain.

Achievement Tests - Tests for the three important subjects in the Singapore school curriculum were selected. They were the STEP tests level 4A in Reading, Mathematics and Science. This level represents the lowest difficulty level in a series of 4 levels, with each level having alternate forms A and B. The manual reported that level 4 is suitable for American pupils in the grade range 4-6. However, because of the heavy language content in these tests, and the fact that at the time of this testing program the Singapore pupils were only at the beginning of their 8th year of schooling, it was considered more appropriate to use this level than the higher level 3.

There are some features common among these tests: 1) each test comes in the form of a test booklet having equal number of items in

each of 2 parts, 2) each part of the test is allowed 35 minutes and the booklet may be administered in one or two sessions, depending on the testing schedule, 3) the tests were also constructed to function as power tests, 4) the tests consist of a number of groups of questions, with all questions in one group relating to the same situation, 5) questions are cast in the multiple-choice form, the subject has to choose the correct answer from among four alternatives, and 6) content validity was emphasized in their development and this was insured through the involvement of well-qualified persons in test construction.

16. Reading 4A - This test measures these abilities in reading comprehension*: 1) to reproduce ideas, 2) to translate ideas and make inferences, 3) to analyze author's motivations, 4) to analyze presentation, and 5) to criticize ideas presented, author's purpose and motivation and the presentation of materials. Each test booklet contains 70 multiple-choice questions, divided equally into 2 parts. Its internal consistency, estimated through the KR formula 20 and with American Grade 5 pupils, was reported to be .95. The standard error of measurement associated with this was 3.45.

17. Mathematics 4A - This instrument measures the following mathematical concepts*: 1) Number and operation, 2) Symbolism, 3) Measurement and geometry, 4) Function and relation, 5) Proof-deductive and inferential reasoning, and 6) Probability and statistics. The approximate percentage distribution of items involving each of these concepts are 51, 2,

*Sequential Tests of Educational Progress. Manual for interpreting scores (Reading, Mathematics and Science). Cooperative Test Division, ETS, Princeton, N.J. 1957.

29, 23, 4 and 4 in the same sequence as the concepts presented here. There are 50 items equally divided between 2 parts in each test booklet. Estimate of its internal consistency was reported to be .89 with a standard error of 3.05. This estimation was obtained from American Grade 5 pupils.

18. Science 4A - This contains 60 items, with 30 items in each of 2 parts. The skills tested and the approximate percentage of items (in brackets), in each skill area are*: 1) to identify and define scientific problems (10%), 2) to suggest or screen hypotheses (25%), 3) to select valid procedures (17%), 4) to interpret data and draw conclusions (23%), 5) to evaluate critically claims or statements made by others (12%), and 6) to reason quantitatively and qualitatively (13%). Distribution of questions among subject areas are as follows: Biology - 40%, Chemistry - 16%, Physics - 23%, Astronomy - 8%, Geology - 7%, and Meteorology - 6%. No test-retest reliability had been reported but estimate of internal consistency (KR 20) had been obtained with American Grade 5 pupils. This was reported to be .91 with a standard error of measurement of 3.35.

Test Administration Procedures

A testing time-table was worked out with school administrators concerned, in a way that did not disrupt the important subject lessons. A testing schedule was then drawn up as shown in Table 3 to fit this time-table.

*Sequential Tests of Educational Progress. Manual for interpreting scores (Reading, Mathematics and Science). Cooperative Test Division, ETS, Princeton, N.J. 1957.

TABLE 3
TESTING SCHEDULE

<u>Testing Sessions</u>	<u>Instruments</u>	<u>Time (mins.)</u>
1	Addition	10
	Std. Raven Progressive Matrices	untimed
2	Step Reading 4A	90
3	Hidden Figures	30
	Division	10
	Concealed Words	15
4	Step Mathematics 4A	90
5	AH4	35
	Form Board	25
6	Figure Classification	25
	Gestalt Completion	15
	Card Rotation	15
7	Step Science 4A	90
8	Hidden Pattern	15
	Letter Sets	25
	Subtraction + Multiplication	10
9	GEFT (Witkin)	20
	CRPBI (Mother Form)	untimed
10	HEQ	untimed

*The Cube Comparisons Test scores were obtained from the Education Ministry's Examination Officer in charge of the Secondary II Aptitude Testing Program, as it is one of the components in the Aptitude Battery which these pupils had to take soon after this testing program was completed.

Each testing session lasted about an hour, except in the case of the STEP tests where time allowance for the taking of one test booklet in one session took 90 minutes. This was not an unusual lengthy test-taking session for these subjects because the usual test-taking time in school subject examinations is usually of this duration. Furthermore a break of 5 minutes was allowed for, in between the two parts of the test. The same schedule was followed for all the pupils in the four schools tested (list of participating schools appears in Appendix IV).

The writer carried out the test administration in class groups, in the pupils' own classrooms. Each class averaged 35 pupils. No teacher was present during the testing session as their presence might arouse undue anxiety in pupils who tended to suspect this testing program as part of the Aptitude Testing Exercise conducted by the Ministry of Education. The administration directions given in the manuals of each test were strictly adhered to. In those sessions where more than one test was administered, an interval of 5 minutes between tests was allowed. The whole testing program was carried out during the middle of March to the end of May, 1975.

Scoring for the cognitive tests followed the scoring procedures reported in the respective test manuals but raw scores were used for converting to normalized scores with a mean of 50 and a standard deviation of 10 within each ethnic group. This was the standard conversion scale for all the measures in the four domains.

CHAPTER VII

ANALYSIS I - WITHIN-DOMAIN FACTOR PATTERNS AND HYPOTHESES TESTING

Within-Domain Factor Patterns

One purpose of the present study was to examine the factor patterns in the ability domain, affective domain, process domain, and status domain, defined and described in Chapters V and VI. This within-domain examination was performed with reference to two major ethnic groups in Singapore, having contrasting socio-cultural histories and learning similar school skills in a language that is not frequently used in their homes. The measures and samples for this purpose have been described in detail in the preceding chapters. This chapter presents analysis for the within-domain factor patternings with respect to the Chinese and Malay samples, and examines how the emergent factors support the hypotheses proposed for investigation.

Within-Ability-Domain Factor Patterns

The 32 test measures in the ability domain were scored and converted into normalized scores with a mean of 50 and standard deviation of 10 for each ethnic sample separately. The raw score means and standard deviations on these 32 measures for the Chinese and Malay samples are presented in Appendix V. Two correlation matrices, one for each ethnic sample (Appendix VI), were computed from the respective sample normalized scores. Using principal axes factoring procedures, and unities in the main diagonal of the correlation matrix, each ethnic

correlation matrix was factor analyzed separately. With reference to eigenvalue plots in Figure 1 (Cattell, 1966) and the criterion of eigenvalue greater than 1 (Harman, 1967; p. 198), nine principal component factors were extracted from each ethnic correlation matrix. These nine factors accounted for 66.34% and 66.91% of the total variance for the Chinese and Malay correlation matrices respectively. Table 4 presents the eigenvalues and percentage of total variance accounted for by these nine unrotated principal component factors for both ethnic matrices. For interpretation, these nine factors were then orthogonally rotated by Varimax method and finally transformed to oblique simple structure by the promax method (Hendrikson & White, 1964).

Tables 5 and 6 present the promax oblique first-order factor patterns of the Chinese sample and Malay sample respectively. An examination of the factor loadings (arbitrarily considering coefficients $> .30$ as substantial contributions) shows that there is considerable similarity between the Chinese and Malay patterns on a number of factors. Greater consideration to establish the similarity or dissimilarity between the two factor patterns is necessary for studying the relationships of these ability-factors to familial psychosocial circumstances and for interpreting the resulting factors in relation to the socio-cultural contexts of these two samples. In accordance with this need, the Kaiser, Hunka, and Bianchini factor-matching procedure for oblique factors (1971) was performed on the factor matrices, with the Chinese factor matrix as the target. This Kaiser et al procedure

FIGURE 1

EIGENVALUE PROFILES FOR THE TEST MEASURES
(PRINCIPAL AXES FACTOR ANALYSES FOR CHINESE AND MALAY SAMPLES)

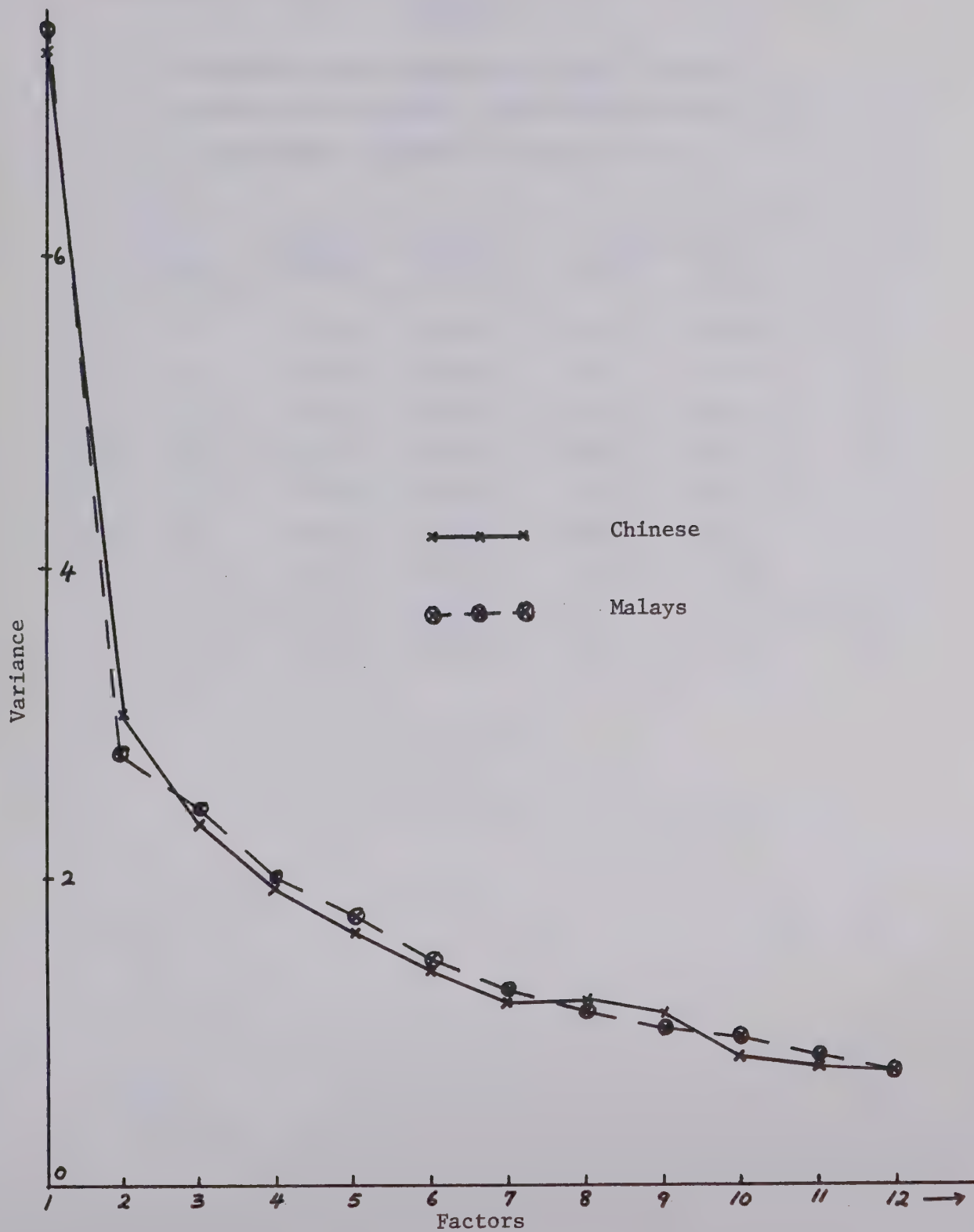


TABLE 4

EIGENVALUES AND PERCENTAGE OF TOTAL VARIANCE
ACCOUNTED FOR BY FIRST 9 UNROTATED PRINCIPAL
COMPONENTS (ELEMENTARY ABILITY-FACTORS)

FACTORS	PERCENT. TOTAL VAR.		EIGENVALUES	
	CHINESE	MALAYS	CHINESE	MALAYS
1	22.845	23.383	7.310	7.482
2	32.351	32.102	3.042	2.790
3	39.711	39.625	2.355	2.407
4	45.772	45.938	1.939	2.020
5	50.799	51.438	1.609	1.760
6	55.255	56.053	1.426	1.477
7	59.045	60.069	1.213	1.285
8	62.812	63.684	1.205	1.157
9	66.341	66.908	1.130	1.032

TABLE 5
CHINESE PROMAX OBLIQUE FIRST-ORDER ABILITY
PATTERN* (N = 147)

	ABILITY-FACTORS										h ²
	I	II	III	IV	V	VI	VII	VIII	IX		
8 Sames	<u>906</u>	-013	100	-020	-046	-128	-029	090	003	806	
10 Series	<u>881</u>	054	078	-050	-008	021	-077	-007	-012	825	
7 Analogies	<u>866</u>	-065	-060	065	015	070	-009	-025	-024	756	
9 Subtractions	<u>842</u>	-068	070	044	009	041	016	105	018	802	
11 Superimpositions	<u>742</u>	-017	023	-030	040	-185	097	-038	240	653	
17 Subtraction + Multi- plication	<u>-082</u>	<u>886</u>	022	097	021	-064	004	-001	-007	814	
15 Addition	045	<u>840</u>	-003	-118	-203	087	034	030	163	755	
16 Division	-035	<u>815</u>	117	091	158	-190	-046	-026	-031	745	
2 Verbal Opposites	081	<u>130</u>	<u>789</u>	-011	-073	-076	055	104	039	689	
4 Verbal Analogies	096	-198	<u>605</u>	053	056	194	-012	-098	047	576	
6 Synonyms	-092	-073	<u>569</u>	<u>524</u>	-121	-083	-041	-082	-073	630	
5 Simple Arith. Computation	121	130	<u>551</u>	070	153	015	-112	184	-194	571	
1 Directions	117	022	<u>415</u>	-023	-052	154	-110	-081	038	298	
14 Science	007	034	-033	<u>861</u>	165	-066	-048	-099	014	766	
12 Reading	065	-108	<u>336</u>	<u>726</u>	-097	-122	-014	-024	105	700	
13 Mathematics	-034	246	-116	<u>680</u>	149	128	032	047	024	730	
23 Hidden Figures	033	-081	-092	<u>161</u>	<u>763</u>	235	153	-110	-013	741	
25 GEFT (Witkin)	-012	-107	037	032	<u>750</u>	168	-086	146	016	657	
24 Hidden Patterns	-054	234	-005	-012	<u>669</u>	085	026	009	286	701	
22 Raven Prog. Matrices (E)	-029	-096	-013	-093	<u>235</u>	<u>874</u>	-028	104	-171	668	
20 Raven Prog. Matrices (C)	-075	-056	093	076	228	<u>636</u>	-191	197	023	590	
21 Raven Prog. Matrices (D)	-094	-062	-152	036	-107	<u>510</u>	206	<u>352</u>	275	612	
3 Numerical Series	056	283	<u>379</u>	-269	042	<u>450</u>	-023	-287	-035	657	
28 Letter Sets	007	133	<u>176</u>	150	-004	<u>321</u>	242	-190	021	417	
30 Cube Comparison	167	100	045	122	-220	<u>339</u>	<u>520</u>	147	-255	609	
32 Form Board	024	-036	-209	-041	088	<u>029</u>	<u>783</u>	-251	031	692	
31 Card Rotation	-269	-008	<u>590</u>	-060	-004	-204	<u>611</u>	170	113	679	
29 Figure Classification	165	090	-053	-067	<u>337</u>	-251	<u>423</u>	066	-237	485	
19 Raven Prog. Matrices (B)	148	081	-114	066	-051	176	-166	<u>711</u>	056	589	
18 Raven Prog. Matrices (A)	-018	-084	252	-228	112	121	009	<u>687</u>	018	581	
27 Concealed Words	062	229	-071	076	021	-139	-123	<u>142</u>	<u>842</u>	754	
26 Gestalt Completion	049	-219	122	-009	219	-053	162	-101	<u>694</u>	681	

Proportions of	120										
Total Variance	-001	082									
	006	002	083								
	000	002	006	071							
	-000	-000	-001	002	066						
	-002	-003	002	-002	003	073					
	-001	000	000	-000	001	-000	054				
	-001	000	000	-033	000	000	-001	049			
	001	000	-000	000	002	-004	-000	001	052		663

Correlations among Oblique Elementary Abilities	I	II	III	IV	V	VI	VII	VIII	IX
Inductive Reasoning I	I	-							
Number Facility	II	138	-						
Verbal Reasoning	III	407	191	-					
School-achievement	IV	154	317	315	-				
Flexibility of Closure	V	288	108	293	147	-			
Inductive Reasoning II	VI	282	296	289	325	086	-		
Spatial + Visualiz- ation	VII	186	095	056	019	143	100	-	
RPM(AB)	VIII	-064	-032	001	119	097	019	091	-
Speed of Closure	IX	144	028	122	076	155	353	071	097

SMCs	254	165	274	227	159	301	064	047	148
------	-----	-----	-----	-----	-----	-----	-----	-----	-----

* Decimal points omitted

TABLE 6

MALAY PROMAX OBLIQUE FIRST-ORDER ABILITY
PATTERN*(N = 180)

	ABILITY-FACTORS									h ²
	I	II	III	IV	V	VI	VII	VIII	IX	
8 Sames	<u>1019</u>	-235	-110	-009	-032	-129	039	054	083	795
10 Series	<u>905</u>	-015	-023	092	-053	-066	035	-006	019	799
9 Subtractions	<u>846</u>	048	069	008	-026	-048	-023	-066	086	779
11 Superimpositions	<u>805</u>	-004	115	-118	095	010	-256	-001	-032	711
7 Analogies	<u>786</u>	173	-119	075	-088	048	076	038	141	701
19 Raven Prog. Matrices (B)	017	<u>915</u>	-056	-064	-128	-094	-038	067	-023	682
21 Raven Prog. Matrices (D)	-173	<u>923</u>	-022	043	-051	011	-004	060	187	690
20 Raven Prog. Matrices (C)	059	<u>758</u>	014	-002	098	-183	-079	-030	-060	664
18 Raven Prog. Matrices (A)	-013	<u>754</u>	-077	-334	-113	154	-074	-058	-035	559
22 Raven Prog. Matrices (E)	-006	<u>619</u>	086	053	136	-098	004	-016	001	534
14 Science	-184	-016	<u>868</u>	195	-026	-056	003	032	-129	740
12 Reading	039	033	<u>865</u>	-106	-042	-089	-029	-004	-158	732
6 Synonyms	048	-309	<u>713</u>	-211	-083	120	200	137	148	546
13 Mathematics	056	031	<u>665</u>	270	045	-007	-059	-062	-114	709
28 Letter Sets	-002	154	<u>390</u>	131	039	205	153	-172	044	519
1 Directions	045	293	<u>357</u>	033	-210	281	016	089	-150	438
5 Simple Arith. Computations	222	130	<u>363</u>	-010	109	068	082	-086	019	480
17 Subtraction + Multiplication	044	-099	<u>064</u>	<u>934</u>	-054	-018	-048	078	018	841
15 Addition	-037	-017	-107	<u>887</u>	084	013	-092	085	-080	739
16 Division	071	-071	288	<u>738</u>	-091	012	-077	-065	109	732
24 Hidden Patterns	-061	-063	-090	034	<u>908</u>	-037	070	-068	025	719
23 Hidden Figures	-043	-108	004	-067	<u>800</u>	123	-090	266	-120	703
25 CEFT (Witkin)	029	254	<u>348</u>	-108	<u>505</u>	-085	-020	189	194	734
31 Card Rotation	-116	-171	119	-119	133	790	-014	-116	080	592
32 Form Board	-148	005	-201	138	-158	<u>744</u>	-127	160	264	658
30 Cube Comparisons	200	-075	-164	013	178	<u>472</u>	003	-035	-464	637
2 Verbal Opposites	-031	-187	051	-180	028	-055	<u>881</u>	-086	153	671
4 Verbal Analogies	-019	078	091	-025	-153	-119	<u>657</u>	<u>308</u>	-184	657
3 Numerical Series	-013	238	-198	234	229	045	<u>533</u>	-163	096	612
26 Gestalt Completion	-048	064	110	060	107	020	-152	<u>831</u>	228	731
27 Concealed Words	095	023	-081	092	064	-014	210	<u>701</u>	-126	609
29 Figure Classification	211	081	-257	010	009	237	095	098	<u>841</u>	700
Proportions of Total Variance	129									
	-003	118								
	-002	-001	105							
	001	-002	004	084						
	-002	-003	-001	-001	064					
	-004	-003	-001	-000	001	055				
	-001	-002	001	003	000	-002	055			
	000	-001	-000	-001	000	000	000	049		
	-001	-002	-000	-000	000	-002	-002	-001	043	

666

Correlations among
Oblique Elementary
Abilities

	I	II	III	IV	V	VI	VII	VIII	IX
Inductive Reasoning I	I	-							
Inductive Reasoning II	II	396	-						
School-achievement	III	447	425	-					
Number Facility	IV	259	192	295	-				
Flexibility of Closure	V	334	444	388	270	-			
Spatial + Visualization	VI	263	209	103	233	219	-		
Verbal Reasoning	VII	271	264	295	236	149	206	-	
Speed of Closure	VIII	-102	-096	-004	-135	014	013	027	-
Classification	IX	-089	-193	019	-004	-106	-125	-223	-138

SMCs 309 347 371 189 286 143 196 075 123

* Decimal points omitted

rotates the Malay test vectors to maximum overlap with the target Chinese test vectors and computes the cosines for the angles between the Chinese factors and the resulting rotated Malay factors. The cosines for the angles between the Chinese oblique first-order ability-factors and the rotated Malay oblique first-order ability-factors are shown in Table 7. An indication of the degree of similarity between pairs of factors is given by the cosine value between the corresponding target factor and matched-factor.

It will be noticed that Table 7 does not display clearly defined high cosine values in either the rows or columns of its matrix. This is because the factors being compared are oblique and a factor in one pattern can be most like another factor in the other pattern while at the same time exhibit moderate similarity with another factor with which both these equivalent factors correlate highly in their own respective patterns. A case in point is the high cosine value between Chinese Factor IV and Malay Factor III as compared with the moderately high cosine value between Malay Factor III and Chinese Factor III. This is meaningful if interpreted in relation to the relatively high correlation between Chinese Factor IV and Factor III in the within-Chinese pattern (bottom of Table 5) and that between Malay Factor III and Factor VII, an equivalent of Chinese Factor III, in the within-Malay pattern (bottom of Table 6). The results in Table 7 show that the degree of similarity between 8 of the 9 factors in the Chinese, and Malay patterns falls within the acceptable values for mathematical

TABLE 7

FACTOR MATCHING FOR PROMAX OBLIQUE FIRST-ORDER
 ABILITY PATTERNS OF CHINESE AND MALAY SAMPLES
 (COSINE VALUES* BETWEEN CHINESE TARGET MATRIX
 AND THE KAISER ET AL ROTATED MALAY MATRIX)

CHINESE FACTORS		MALAY FACTORS								
	I	II	III	IV	V	VI	VII	IX	VII	
I	<u>99</u>	21	46	30	27	31	12	12	-05	
IV	21	<u>98</u>	15	29	09	36	13	16	-15	
VII	24	21	<u>78</u>	-01	-01	34	-21	22	-36	
III	34	35	65	<u>92</u>	37	41	-13	13	15	
V	32	23	22	29	<u>81</u>	54	14	20	-18	
II	35	22	36	41	23	<u>81</u>	-00	33	51	
VI	29	18	37	19	04	37	<u>88</u>	11	-07	
VIII	-05	-25	01	-00	14	-10	10	<u>87</u>	-00	
IX	-05	14	18	-17	44	31	14	-29	48	

*Decimal points omitted

similarity (Hunka; personal communication).

Equivalent Chinese and Malay Ability-Factors. Interpretations of the results in Tables 5, 6, and 7 show that eight factors in the Chinese and Malay oblique first-order ability patterns may be considered to have close similarity. These eight relatively similar factors have been given common factor designations.

- 1) Inductive Reasoning I. This factor designation describes Chinese Factor I and Malay Factor I. The largest coefficients appear for the test measures constituting Part II components of AH4, namely, Sames, Series, Subtractions, Analogies and Superimpositions. Within-ethnic pattern correlations show that this factor correlates highly with Malay School-achievement factor (.447) but hardly so with Chinese School-achievement factor (.154).
- 2) Number Facility. This factor designation subsumes Chinese Factor II and Malay Factor IV. The most highly loaded test measures on this factor are the original three French, Ekstrom, and Price (FEP) tests describing this same named factor, namely, Subtractions and Multiplications, Addition, and Division in order of decreasing loading strengths as they appear in both Chinese Factor II and Malay Factor IV.
- 3) Verbal Reasoning. This characterizes Chinese Factor III and Malay Factor VII. Highest positive coefficients appear for test measures, Verbal Opposites, and Verbal Analogies (both are two of AH4 Part I components) for both Chinese and Malay factors. This factor correlates very highly with Inductive Reasoning I in the within-Chinese factor pattern but only moderately with the same factor in the within-Malay

pattern. For both ethnic samples, it has a school-achievement bias as is shown both by the relatively high cosine value between this Chinese factor and the Malay School-achievement factor and the relatively high correlation between this factor and the corresponding within-ethnic pattern School-achievement factor (mentioned above).

4) School-achievement. This interpretation applies to the equivalent Chinese Factor IV and Malay Factor III. As the name implies, this factor is defined by the achievement tests of STEP 4A Science, Reading and Mathematics in decreasing loading magnitude as they appear in both the Chinese and Malay factors. Apparently this is one single factor within the Malay pattern that correlates most highly with all the reasoning factors, and exhibits highest SMC with all the other within-Malay pattern factors. For the Chinese sample, this factor correlates relatively high with Number Facility, Verbal Reasoning, and Inductive Reasoning II but not to any appreciable extent with Inductive Reasoning I. Chinese School-achievement factor appears to be more sharply differentiated from its other within-Chinese pattern factors than what Malay School-achievement factor appears to be in the within-Malay pattern.

5) Flexibility of Closure. This describes the similar Chinese Factor V and Malay Factor V. Test measures which load highly on this factor are the original FEP tests of Hidden Figures and Hidden Patterns, and the Witkin Group Embedded Figures Test. This reproducibility of the factor in the Chinese and Malay patterns lends support to Euro-American stable findings on this factor (Hakstian & Cattell, 1974; Horn, 1972; Royce, 1973).

6) Spatial + Visualization. This interpretation is given to the equivalent Chinese Factor VII and Malay Factor VI on the basis that the highly loaded test measures on it come from the FEP Spatial and Visualization factors. This factor is defined by highest positive loadings from the Card Rotation test (a FEP Spatial Orientation test) and Form Board test (a FEP Visualization test) for both Chinese and Malay patterns. Another descriptive test measure of this factor in both ethnic patterns is the Cube Comparisons test, also a FEP Spatial-Orientation test. While equivalent test loadings and mathematical factor-match gave cooperative support to this close similarity between Chinese Factor VII and Malay Factor VI, the within-ethnic factor intercorrelations and SMCs show that Chinese Spatial + Visualization factor exists as a relatively independent factor and correlates least with School-achievement ability. On the other hand, its equivalent Malay factor though exhibiting relatively low correlation with School-achievement ability-factor, has moderate correlations with its within pattern reasoning ability-factors.

7) Speed of Closure. This designation is descriptive of Chinese Factor IX and its equivalent Malay Factor VIII. The test measures that represent good markers of this factor are the same FEP Speed of Closure tests, namely, Gestalt Completion and Concealed Words. The reproducibility of this factor in both Chinese and Malay patterns brings the total number of reproduced FEP elementary ability-factors here to be four. This reiterates the support for consistent findings on stable elementary ability-factors mentioned before. It is to be noted that Malay Speed of Closure factor is the most independent ability in its within-Malay-pattern while its Chinese equivalent though also relatively

independent, correlates substantially with the Inductive Reasoning II ability-factor.

8) Inductive Reasoning II. This common designation for Chinese Factor VI and Malay Factor II follows from the relatively high index of mathematical similarity between these two factors and the rather similar cluster of marker test measures. The main marker test measures for Chinese Factor VI are RPM(E), RPM(C) and RPM(D), and the main marker test measures for Malay Factor II are RPM(B), RPM(D), and RPM(C). However, the manner in which each of these two factors correlate with other factors in their respective ethnic-patterns seems to hint that this interpretation of similarity between them should be viewed with some reservations. Each of these two factors appear to correlate highly with a different one of two complementary aspects of the field articulation style of cognition (Witkin et al, 1971; p. 14) in each within-ethnic pattern - in the Chinese ability pattern, Factor VI correlates highest with the Speed of Closure factor (Structuring aspect) and in the Malay pattern Factor II's highest correlate is the Flexibility of Closure factor (Analytical aspect). Added to this is the relatively low correlation between Flexibility of Closure and Speed of Closure in both Chinese ability pattern and Malay ability pattern.

Unrelated Chinese and Malay Ability-Factors Chinese Factor VIII.

This factor is described primarily by RPM(B) and RPM(A). Clearly it has no Malay counterpart. It is difficult to attach any meaningful interpretation to this factor both because of its limited number of describing test measures and its independent existence within the Chinese ability pattern. Hence it is given the designation of RPM(AB)

on account of its two main marker tests.

Malay Factor IX. This single Malay ability-factor which has no equivalent factor in the Chinese ability pattern, has only a highly loaded test measure, the Figure Classification Test from the FEP Induction elementary factor. Its limited number of describing test measures compounded by its relative independence within the Malay ability pattern makes it difficult to give it any psychological description other than to follow its solely defining test title. For this reason this factor is designated as Classification in the Malay ability pattern.

In summing up, the sampled 32 test measures in the Ability Domain are parsimoniously described by nine albeit not exactly equivalent promax oblique first-order factors for both the Chinese and Malay samples in this study. Seven clearly equivalent factors and one seemingly equivalent factor exist among Chinese promax oblique first-order ability pattern and Malay promax oblique first-order ability pattern. Table 8 shows the juxtaposition of these two patterns with their within-pattern factors rearranged so that the eight equivalent factors appear in corresponding columns of each pattern matrix.

The reproducibility of four out of five input FEP elementary ability-factors among these two ethnic patterns echoes the consistent Euro-American findings on the stability of elementary ability-factors. The emergence of the Verbal Reasoning and School-achievement factors in both ethnic patterns and their relatively high within-ethnic pattern SMCs (as attested by the results at the bottom of Tables 5 and 6) add

TABLE 8
 PROMAX OBLIQUE FIRST-ORDER ABILITY* PATTERNS
 FOR CHINESE AND MALAY SAMPLES ($N_C = 147$, $N_M = 180$)

Test Numbers	CHINESE ABILITIES										h^2	MALAY ABILITIES										h^2
	I	II	III	IV	V	VI	VII	IX	VIII	I		IV	VII	III	V	II	VI	VIII	IX			
8	<u>91</u>	-01	10	-02	-05	-13	-03	00	09	81	<u>102</u>	-01	04	-11	-03	-24	-13	05	07	80		
10	<u>88</u>	05	08	-05	-01	02	-08	-01	-01	83	<u>91</u>	09	04	-02	-05	-02	-07	-01	02	80		
7	<u>87</u>	-07	-06	07	02	07	-01	-02	-03	76	<u>79</u>	08	08	-12	-09	17	05	04	14	70		
9	<u>84</u>	-07	07	04	01	04	02	02	11	80	<u>85</u>	01	-02	07	-03	05	-05	-07	09	78		
11	<u>74</u>	-02	02	-03	04	-19	10	24	-04	65	<u>81</u>	-12	-26	12	10	-00	01	-00	-03	71		
17	-08	<u>89</u>	02	10	02	-06	00	-01	-00	81	<u>93</u>	-05	06	-05	-10	-02	08	02	84			
15	05	<u>84</u>	-00	-12	-20	09	03	16	03	76	-04	<u>89</u>	-09	-11	08	-02	01	09	-08	74		
16	-04	<u>82</u>	12	09	16	-19	-05	-03	-03	75	07	<u>74</u>	-08	29	-09	-07	01	-07	11	73		
2	08	13	<u>79</u>	-01	-07	-08	06	04	10	69	-03	-18	<u>88</u>	05	03	-19	-06	-09	15	67		
4	10	-20	<u>61</u>	05	06	19	-01	05	-10	58	-02	-03	<u>66</u>	09	-15	08	-12	31	-18	66		
6	-09	-07	<u>57</u>	<u>52</u>	-12	-08	-04	-07	-08	63	05	-21	<u>20</u>	<u>71</u>	-08	-31	12	14	15	55		
5	12	13	<u>55</u>	07	15	02	-11	-19	18	57	22	-01	08	<u>36</u>	11	13	07	-09	02	48		
1	12	02	<u>42</u>	-02	-05	15	-11	04	-08	30	05	03	02	<u>36</u>	-21	29	28	09	-15	44		
14	01	03	-03	<u>86</u>	17	-07	-05	01	-10	77	-18	20	00	<u>87</u>	-03	-02	-06	03	-13	74		
12	07	-11	<u>34</u>	<u>73</u>	-10	-12	-01	11	-02	70	04	-11	-03	<u>87</u>	-04	03	-09	-00	-16	73		
13	-03	25	-12	<u>68</u>	15	13	03	02	05	73	06	27	-06	<u>67</u>	05	03	-01	-06	-11	71		
23	03	-08	-09	16	76	24	15	-01	-11	74	-04	-07	-09	00	<u>80</u>	-11	12	27	-12	70		
25	-01	-11	04	003	<u>75</u>	17	-09	02	15	66	03	-11	-02	<u>35</u>	<u>51</u>	25	-09	19	19	73		
24	-05	23	-01	-01	<u>67</u>	09	03	29	01	70	-06	03	07	-09	<u>91</u>	-06	-04	-07	03	72		
22	-03	-10	-01	-09	24	<u>87</u>	-03	-17	10	67	-01	05	00	09	14	<u>62</u>	-10	-02	00	53		
20	-08	-06	09	08	23	<u>64</u>	-19	02	20	59	06	-00	-08	01	10	<u>76</u>	-18	-03	-06	66		
21	-09	-06	-15	04	-11	<u>51</u>	21	28	35	61	-17	04	-00	-02	-05	<u>92</u>	01	06	19	69		
3	06	28	<u>38</u>	-27	04	<u>45</u>	-02	-04	-29	66	-01	23	<u>53</u>	-20	23	24	05	-16	10	61		
28	01	13	<u>18</u>	15	-00	<u>32</u>	24	02	-19	42	-00	13	<u>15</u>	<u>39</u>	04	15	21	-17	04	52		
30	17	10	05	12	-22	<u>34</u>	52	-26	15	61	20	01	00	-16	18	-08	<u>47</u>	-04	-46	64		
32	02	-04	-21	-04	09	<u>03</u>	<u>78</u>	03	-25	69	-15	14	-13	-20	-16	01	<u>74</u>	16	26	66		
31	-27	-01	59	-06	-00	-20	<u>61</u>	11	17	68	-12	-12	-01	12	13	-17	<u>79</u>	-12	08	59		
29	17	09	-05	-07	34	-25	<u>42</u>	-24	07	49	21	01	10	-26	01	08	24	10	<u>84</u>	70		
27	06	23	-07	08	-02	-14	-12	<u>84</u>	15	75	10	09	-21	-08	06	02	-01	70	-13	61		
26	-05	-22	12	-01	22	-05	16	<u>69</u>	-10	68	-05	06	-15	11	11	06	02	<u>83</u>	23	73		
19	15	08	-11	07	-05	-18	-17	<u>06</u>	<u>71</u>	59	02	-06	-04	-06	-13	<u>92</u>	-09	07	-02	68		
18	-02	-08	25	-23	11	-12	01	02	<u>69</u>	58	-01	-33	-07	-08	-11	<u>75</u>	15	-06	-04	56		

Proportions of Total Variance

12									
-00	08								
01	00	08							
00	00	01	07						
-00	-00	-00	00	07					
-00	-00	00	-00	00	07				
-00	00	00	-00	00	-00	05			
-00	00	00	-03	00	00	-00	05		
00	00	-00	00	00	-00	-00	00	05	

66

Proportions of Total Variance

13									
00	08								
-00	-00	06							
-00	00	00	11						
-00	-00	00	-00	16					
-00	-00	-00	-00	-00	12				
-00	-00	-00	-00	00	-00	06			
-00	-00	00	-00	00	-00	00	05		
00	-00	-00	-00	00	-00	-00	-00	04	

67

Correlations Among Oblique

First Order-Abilities

	I	II	III	IV	V	VI	VII	IX	VIII
I	-								
II	14	-							
III	41	19	-						
IV	15	32	32	-					
V	29	11	29	15	-				
VI	28	30	29	33	09	-			
VII	17	10	06	02	14	10	-		
IX	14	-03	00	12	10	02	07	-	
VIII	-06	03	12	08	16	35	09	10	-
SMCs	25	17	27	23	16	30	06	15	05

Correlations Among Oblique

First-Order Abilities

	I	IV	VII	III	V	II	VI	VIII	IX
I	-								
IV	26	-							
VII	27	24	-						
III	45	30	30	-					
V	33	27	15	39	-				
II	40	19	26	43	44	-			
VI	26	23	21	10	22	21	-		
VIII	-10	-14	03	-00	01	-10	01	-	
IX	-09	-00	-22	-02	-11	-19	-13	-14	-
SMCs	31	19	20	37	29	35	14	08	12

* Decimal points omitted

credibility to the original rationale of describing this ability domain as representing school-related skills.

The unrelated Chinese and Malay ability-factors are not clearly defined. They appear to be sparked off by the instrument specificity of the isolated defining tests. Malay School-achievement ability-factor stands out as the factor which exhibits highest correlation with all the other within-Malay pattern factors as shown by its highest SMC at the bottom of Table 6. In addition all the within-Malay-pattern reasoning factors show highest correlations with the School-achievement factor. The Chinese School-achievement factor appears to be more differentiated from the other within-Chinese pattern factors than the Malay School-achievement factor is from its own pattern factors, its SMC having only a within-Chinese pattern rank of 4.

Within-Affective-Domain Factor Patterns.

Following the Schaefer method of scoring the items in the CRPBI, scores on the 18 scales were computed from the item scores (Appendix III). The means and standard deviations on these variables appear in Appendix VII. The raw scale scores were converted to normalized scores with a mean of 50 and a standard deviation of 10 separately for each ethnic sample. Intercorrelations among the 18 normalized scale scores were computed separately for the Chinese and Malay data. The Chinese and Malay matrices of intercorrelations (Appendix VIII) were each factor analyzed, using the same factoring procedures as the Renson et al study (op cit), of principal component factoring and orthogonal Varimax rotation. Table 9 shows the unrotated principal component factors for both samples.

TABLE 9

UNROTATED PRINCIPAL COMPONENT FACTORS* OF CRPBI
(MOTHER FORM) FOR CHINESE AND MALAY SAMPLES
(NChinese = 144, NMalay = 190)

CRPBI Scales	CHINESE FACTORS				MALAY FACTORS				
	1	2	3	h ²	1	2	3	4	h ²
Acceptance of Individuation	528	-562	402	755	595	-279	470	-039	655
Acceptance	598	-597	310	810	578	-548	365	081	774
Positive Involvement	730	-503	244	845	624	-417	380	094	716
Child-centredness	695	-449	203	726	575	-460	322	098	656
Possessiveness	758	-076	032	582	621	-135	-033	-257	470
Intrusiveness	733	-315	-124	652	622	-313	-308	253	644
Control through Guilt	747	170	-068	592	589	-126	-274	-353	563
Hostile Control	824	087	-267	757	599	-123	-304	264	536
Control through Instilling Persistent Anxiety	717	264	-246	644	638	202	-287	-367	664
Control through Withdrawal of Relationships	536	520	-136	576	716	289	012	-064	601
Rejection	364	801	073	780	506	626	-086	-010	656
Hostile Detachment	250	776	091	673	450	692	-014	115	695
Inconsistent Discipline	417	498	353	547	499	476	-075	-056	484
Nonenforcement	026	539	652	717	171	632	189	546	762
Extreme Autonomy	-002	095	836	708	133	471	680	055	705
Lax Discipline	236	191	750	654	415	329	420	-367	592
Control	754	018	-364	700	581	-311	-319	247	597
Enforcement	656	303	-375	664	637	176	-325	130	559
Variance Totals	6.227	3.528	2.627	12.382	5.475	2.989	1.844	1.020	11.329
% of Common Variance	50.289	28.495	21.215	100.000	48.331	26.388	16.274	9.007	100.000
% of Total Variance	34.592	19.601	14.593	68.787	30.418	16.608	10.242	5.669	62.938

* Decimal points omitted

Three principal component factors with eigenvalues greater than unity were obtained with the Chinese data. These three factors were orthogonally rotated by the Varimax method. In the case of the Malay matrix, four principal component factors with eigenvalues greater than 1 were obtained but only the three factors with eigenvalue substantially greater than 1 were extracted and rotated orthogonally by the Varimax method. This was guided by the closeness in these first 3 factors with the three Chinese factors and the low variance contribution from the fourth factor (Table 9).

The emergent CRPBI scale patterns for the Chinese and Malay samples were compared with that obtained for the Walloons by Renson (op cit). Table 10 shows the orthogonal Varimax rotated factors for the Walloon (Renson et al, 1965), Chinese, and Malay groups for a comparative study. An examination of the scale loadings on the Varimax rotated factors showed that the three factors were similar on all three ethnic groups. Differences in the patterns existed in the differential sequencing of equivalent factors within each pattern (Table 10).

Acceptance vs Rejection Factor: Walloon Factor 1, Chinese Factor 2, and Malay Factor 3. This factor has high positive loadings on Acceptance, Positive Involvement, Childcentredness, and Acceptance of Individuation for all three ethnic groups, though the high negative loading on Hostile Detachment in the Walloon case was less pronounced in the Chinese data and more so with the Malay data.

TABLE 10

VARIMAX ROTATED FACTORS* OF CRPBI FOR WALLOON: CHINESE AND
MALAY SAMPLES (NWalloons = 182, NChinese = 144, NMalays = 190)

CRPBI Scales	WALLOON FACTORS			CHINESE FACTORS			MALAY FACTORS		
	1	2	3	2	1	3	3	1	2
Acceptance	<u>91</u>	11	-11	<u>90</u>	-03	-04	<u>84</u>	-24	11
Positive Involvement	<u>89</u>	-07	10	<u>90</u>	-20	-04	<u>81</u>	-24	-03
Child-centredness	<u>85</u>	-17	-11	<u>82</u>	-22	-03	<u>76</u>	-26	05
Acceptance of Individuation	<u>81</u>	22	-15	<u>86</u>	04	-13	<u>78</u>	-14	-15
Possessiveness	<u>54</u>	-52	-05	<u>55</u>	-53	-08	<u>39</u>	-48	-16
Intrusiveness	<u>34</u>	-67	16	<u>65</u>	-45	18	29	-70	07
Hostile Control	06	-86	15	38	-78	09	19	-65	-08
Control through Guilt	06	-83	-07	34	-68	-11	20	-62	-09
Control through Instilling Persistent Anxiety	-12	-76	09	19	-78	-00	06	-62	-38
Rejection	-56	-64	-28	-31	-66	-50	-09	-74	-32
Control through Withdrawal of Relationships	-38	-63	-16	-07	-73	-20	26	-45	-57
Hostile Detachment	-74	-42	-28	-36	-55	-49	-11	-22	-79
Nonenforcement	-13	-07	-72	-15	-04	-83	-09	11	-67
Lax Discipline	45	07	-63	26	02	-77	35	05	-58
Extreme Autonomy	05	22	-61	20	29	-77	30	45	-64
Inconsistent Discipline	-20	-50	-48	03	-43	-60	-01	-33	-61
Control	14	-60	51	35	-73	22	26	-68	09
Enforcement	-20	-68	39	09	-80	10	04	-65	-35
% Common Variance				36.51	40.07	23.42	31.22	33.63	33.15
% Total Variance				25.16	27.56	16.11	17.88	20.41	18.99

*Decimal points omitted

Factor Designations by column ordering within-ethnic samples:

Column 1 - Acceptance vs Rejection

Column 2 - Psychological Control

Column 3 - Lax vs Firm Control

Psychological Control Factor: Walloon Factor 2, Chinese Factor 1, and Malay Factor 1. The most highly loaded scales on this factor are Hostile Control, Control through Guilt, and Control through Instilling Persistent Anxiety for the Walloon group; Enforcement, Hostile Control, Control through Guilt, and Control through Instilling Persistent Anxiety for the Chinese group; and Intrusiveness, Control, Hostile Control, Enforcement, Control through Guilt, and Control through Instilling Persistent Anxiety for the Malay group.

Lax vs Firm Control; Walloon Factor 3, Chinese Factor 3, and Malay Factor 2. Highest positive loadings on this factor are contributed by the Nonenforcement, Lax Discipline, and Extreme Autonomy for both the Walloon and Chinese groups. In the case of the Malay group, these scale loadings are relatively high, but not the highest. This factor also has highest negative loading on the Control scale for the Walloon and Chinese groups, but not for the Malay group.

To investigate the similarity between the Chinese and Malay factor loading matrices, the Kaiser et al factor-matching procedure for orthogonal factors (op cit) was performed on the matrices, with the Chinese Varimax factor matrix as the target. The cosines for the angles between the target Chinese factors and the matched Malay factors are shown in Table 11. The same factor-matching procedure was replicated with the Walloon-Chinese and Walloon-Malay sets of factor loading matrices, using the Walloon factor matrix as the target for rotation to maximum overlap of scale vectors. The results of these two factor-matches are also shown in Table 11.

TABLE 11

KAISER ET AL ROTATED CRPBI COSINE VALUES*
 BETWEEN TARGET FACTOR MATRIX AND ROTATED
 FACTOR MATRIX FOR THREE ETHNIC SAMPLES

TARGET REFERENCE AXES				
ROTATED REFERENCE AXES		WF1	WALLOONS WF2	WF3
CHINESE	CF2	<u>964</u>	065	257
	CF1	-078	<u>996</u>	040
	CF3	-253	-058	<u>966</u>
		WF1	WALLOONS WF2	WF3
MALAYS	MF3	<u>994</u>	-081	078
	MF1	079	<u>997</u>	019
	MF2	-079	-012	<u>997</u>
		CF1	CHINESE CF2	CF3
MALAYS	MF1	<u>925</u>	174	-339
	MF3	-102	<u>970</u>	221
	MF2	367	-170	<u>915</u>

*Decimal points omitted

Factor Designations:

Acceptance vs Rejection - CF2, MF3, WF1

Psychological Control - CF1, MF1, WF2

Lax vs Firm Control - CF3, MF2, WF3

It will be noticed that unlike Table 7, Table 11 shows distinctly high cosine values for the angles between similar factors. This is because the factors in this case are orthogonal ones. The results in all the three factor-matches show that the three major factors underlying the CRPBI scales, obtained with the Walloon, Chinese, and Malay samples may be considered to be equivalent. This supports the subjective matching in terms of high scale loadings.

Within-Process-Domain Factor Patterns.

The 7 process variables listed under measures in the process domain were scored according to the Rating Scheme in Appendix II. The means and standard deviations of the raw scores on these variables appear in Appendix VII. The raw scores were converted to normalized scores with a mean of 50 and a standard deviation of 10 separately for each ethnic sample. Intercorrelations among the normalized scores on these 7 variables were computed for the Chinese and Malay samples separately. Each of the resulting ethnic correlation matrix (Appendix VIII) was factor analyzed using the same factoring procedures and rotational method as had been performed on the cognitive tests.

Applying the same factor extracting criteria as had been done for the ability patterns (Figure 2), two unrotated principal component factors were obtained for the Chinese, and Malay correlation matrix separately. Table 12 presents these two unrotated factors with their corresponding eigenvalues and percentage of total variance accounted for. The promax oblique first-order process patterns for both Chinese and Malay samples appear in Table 13.

FIGURE 2

EIGENVALUE PROFILES FOR THE PROCESS VARIABLES
(PRINCIPAL AXES FACTOR ANALYSES FOR CHINESE AND MALAY SAMPLES)

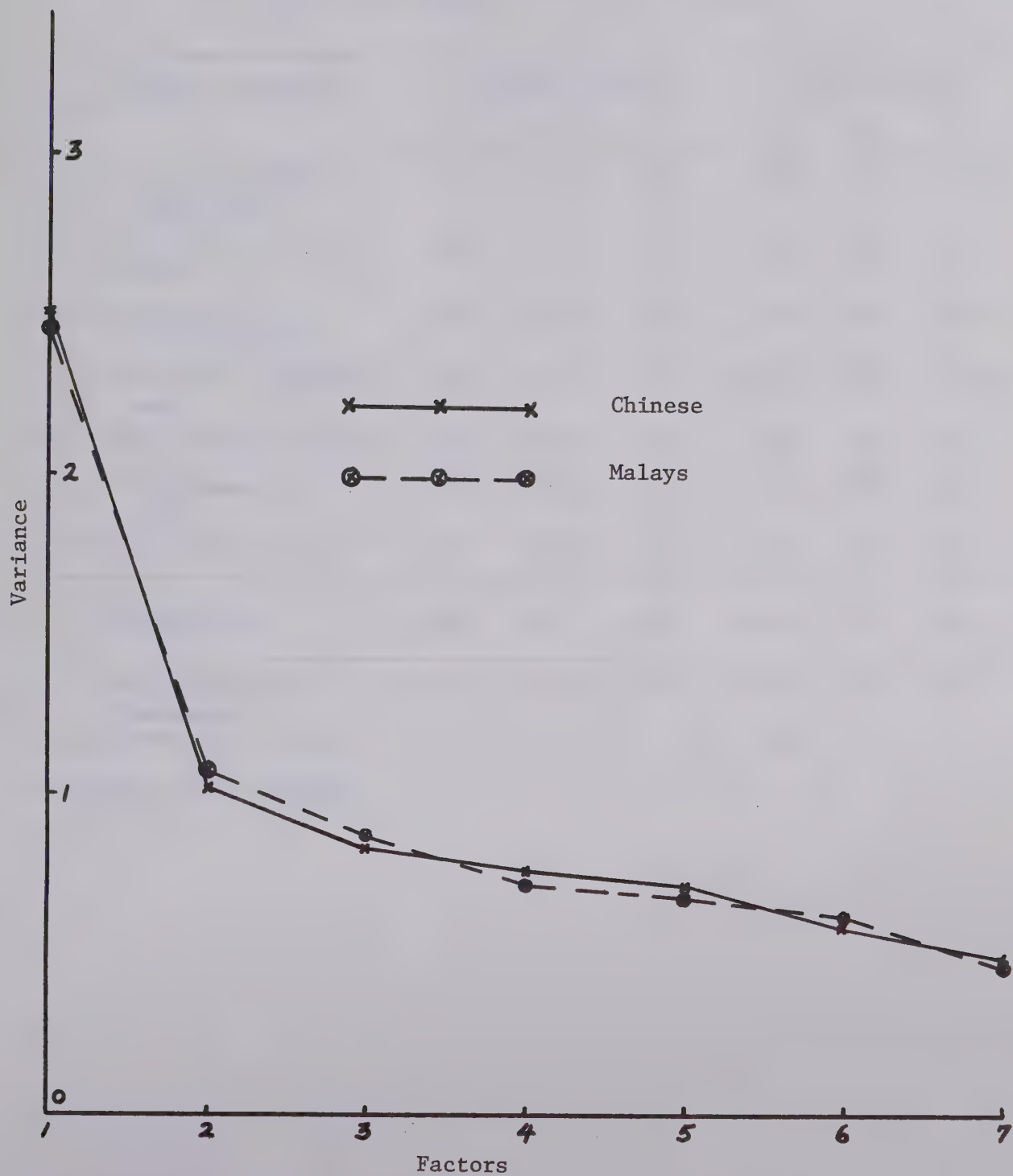


TABLE 12

CHINESE AND MALAY FIRST-ORDER UNROTATED
PROCESS-FACTORS* WITH THEIR ASSOCIATED
EIGENVALUES AND PERCENTAGE OF TOTAL VARIANCE

Process Variables	CHINESE FACTORS			MALAY FACTORS		
	I	II	h^2	I	II	h^2
1. Press for School-achievement	676	-296	544	609	-323	476
2. Press for Activeness	673	241	511	726	258	594
3. Press for Intellectuality	617	267	451	712	097	517
4. Press for Independence	-379	821	817	-073	872	766
5. Model Identification	548	-019	301	445	270	271
6. Planfulness in Family	534	-108	296	573	-273	403
7. Press for English	715	353	635	737	055	546
Eigenvalues	2.529	1.027	3.555	2.482	1.091	3.573
Percentage Total Variance	36.123	14.666	50.789	35.454	15.592	51.047

*Decimal points omitted

TABLE 13

PROMAX OBLIQUE FIRST-ORDER PROCESS PATTERNS*
 FOR CHINESE (N = 145) AND MALAY (N = 172) SAMPLES

Process Variables	Chinese Factors			Malay Factors		
	I	II	h^2	I	II	h^2
Press for English	<u>874</u>	-200	635	<u>735</u>	015	546
Press for Activeness	<u>753</u>	-087	511	<u>803</u>	-196	594
Press for Intellectuality	<u>725</u>	-131	451	<u>727</u>	-030	517
Model Identification	<u>447</u>	168	301	<u>535</u>	-236	271
Planfulness in Family	<u>366</u>	263	296	<u>449</u>	340	403
Press for INdependence	313	<u>-1013</u>	817	267	<u>-912</u>	766
Press for School-achievement	341	<u>509</u>	544	<u>465</u>	<u>395</u>	476
<hr/>						
Proportions of Total Variance	I	344		I	355	
	II	-042	207	II	-016	171
			509			510
<hr/>						
Correlations Among Oblique First-Order Factors	I	II		I	II	
Learning Environment	I	-		I	-	
Independence vs School- achievement Motivation	II	483	-	II	282	-

*Decimal points omitted

The same factor-matching procedure as had been done on the Chinese and Malay promax oblique first-order ability patterns was also carried out on these Chinese and Malay promax oblique first-order process-factor patterns. Table 14 shows the results of the mathematical factor-match. The Chinese and Malay promax oblique first-order process patterns are interpreted to be similar both from the loading strength of variables and the mathematical indices of similarity.

The two Chinese and Malay equivalent process-factors are designated as Learning Environment, defined by main marker variables, such as 'Press for English', 'Press for Activeness', and 'Press for Intellectuality'; and Independence vs Parental School-achievement Motivation with main marker variables such as 'Press for Independence' (high negative loading) and 'Press for School-achievement' (moderate positive loading).

Within-Status-Domain Factor Patterns.

The same scoring, factoring, and rotational procedures, and factor extraction criteria (Figure 3), as had been done with the variables in the Process Domain were performed on the 11 status variables, for the Chinese and Malay sample separately. The Chinese and Malay raw score means and standard deviations of these variables appear in Appendix VII, together with those of the other psychosocial variables. The Chinese and Malay matrices of intercorrelations among the normalized scores on the 11 status variables appear in Appendix VIII.

Four unrotated principal component factors were extracted from

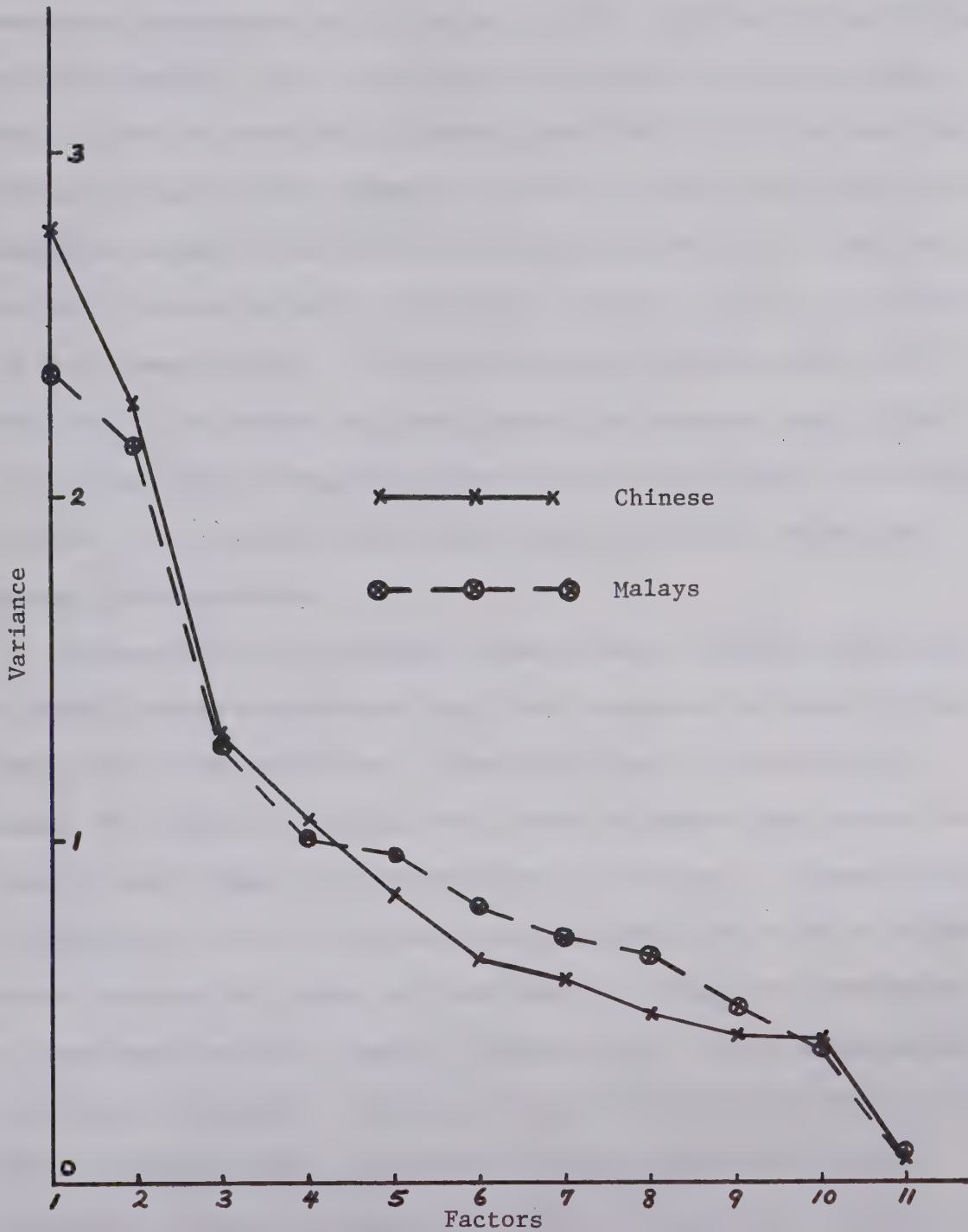
TABLE 14

KAISER ET AL ROTATED PROCESS COSINE VALUES BETWEEN
 TARGET FACTOR MATRIX AND ROTATED FACTOR MATRIX

<div> <div>ROTATED REFERENCE AXES</div> <div>TARGET REFERENCE AXES</div> </div>		CHINESE	
		I	II
MALAYS	I	<u>.989</u>	.610
	II	.133	<u>.932</u>

FIGURE 3

EIGENVALUE PROFILES FOR THE STATUS VARIABLES
(PRINCIPAL AXES FACTOR ANALYSES FOR CHINESE AND MALAY SAMPLES)



the Chinese and Malay correlation matrix separately. Table 15 presents these four unrotated principal component factors together with their associated eigenvalues and percentage of total variance for the Chinese and Malay samples. The Chinese and Malay promax oblique first-order status-factor patterns are juxtaposed under Table 16. Using variable loading strength as the judgmental criterion, two of the factors may be considered as equivalent across ethnic patterns, while the remaining two Malay factors represent the fission products of one of the remaining two Chinese factors. The same factor-matching procedure as had been done on the Chinese and Malay process patterns was also carried out on these Chinese and Malay promax oblique first-order status-factor patterns. The results of this factor-match (Table 17) confirm the loading interpretations.

Chinese Factor II is similar to Malay Factor I and is designated as Elder's Occupational-Educational (O-E) Status on the basis of the common main marker variables - 'Educational Level of Highest Wage Earner, Not Parents', 'Occupational Status of Highest Wage Earner, Not Parents', and 'Highest Educational Level of Siblings'. Chinese Factor III and Malay Factor III are equivalent and are interpreted as Sibling Size vs Maternal O-E Status as their highest loadings are contributed by these same variables, namely, 'Sibling Size', 'Mother's Occupation', and 'Mother's Education'. Chinese Factor I interpreted as Paternal O-E Status + Material Index on the basis of high loadings from these variables of 'Father's Occupation', 'Father's Education', 'Material

TABLE 15

CHINESE AND MALAY FIRST-ORDER UNROTATED STATUS-FACTORS*
WITH THEIR ASSOCIATED EIGENVALUES AND PERCENTAGE OF TOTAL VARIANCE

Status-Variables	CHINESE FACTORS				MALAY FACTORS					
	I	II	III	IV	h ²	I	II	III	IV	h ²
Number of Siblings	-034	502	-600	198	653	351	-287	-247	495	511
Father's Occupation	764	-153	-056	-171	639	317	639	-239	273	640
Father's Education	770	-145	184	-151	670	254	731	-148	343	739
Mother's Occupation	-097	-024	663	312	547	095	400	716	-156	706
Mother's Education	606	-161	466	-004	611	128	677	391	083	635
Home Induction to Sch. Instr. Languages	150	-013	088	840	735	278	108	284	070	174
Type of House	746	-025	-233	121	626	265	325	-419	-535	638
Material Wealth	729	024	-258	-017	599	296	377	-323	-463	548
Highest Educational Level of Siblings	341	556	-094	327	542	613	-062	-233	145	456
Ed. of Highest Wage Earner, Not Parents	081	910	259	-175	933	855	-349	211	-088	904
Occ. of Highest Wage Earner, Not Parents	089	907	253	-164	920	838	-363	205	-116	890
Eigenvalues	2.796	2.285	1.322	1.073	7.476	2.358	2.161	1.307	1.016	6.841
Percentage of Total Variance	25.414	20.769	17.688	14.356	67.959	21.439	19.643	11.878	9.235	62.195

*Decimal points omitted

TABLE 16

PROMAX OBLIQUE FIRST-ORDER STATUS PATTERNS*
FOR CHINESE (N = 145) AND MALAY (N = 172) SAMPLES

Status Variables	Chinese Factors					Malay Factors				
	II	III	I	IV	h ²	I	III	II	IV	h ²
Education of Elders	996	-001	-040	-142	933	995	126	-140	043	904
Occupation of Elders	987	-006	-033	-131	920	989	120	-171	063	890
Highest Educational level of Sib	384	-243	197	367	542	469	-231	276	094	456
Mother's Occupation	148	635	-228	378	547	199	868	013	-088	706
Mother's Education	099	536	565	084	611	-039	633	467	-050	635
Number of Siblings	135	-737	-081	157	653	252	-433	284	-307	511
Father's Occupation	-048	043	808	-125	639	-103	008	785	122	640
Father's Education	055	274	783	-082	670	-179	110	857	032	739
Material Wealth	-025	-213	739	017	599	093	-018	126	705	548
Type of House	-103	-178	731	164	626	067	-115	058	793	638
Home Induction to School Languages	-237	070	-037	897	735	290	310	120	-113	174
<hr/>										
Proportions of Total Variance	II 203					I 221				
	III 001	132				III -009	141			
	I -001	-001	251			II -012	002	164		
	IV -014	001	-001	109		IV -001	-003	004	116	
					680					623
<hr/>										
Correlations Among Oblique First-Order Factors	II	III	I	IV		I	III	II	IV	
	II -					I -				
	III -172	-				III -221	-			
	I 070	-022	-			II 220	045	-		
	IV 275	-096	157	-		IV -047	147	168	-	
<hr/>										
Squared Multiple Correlations SMCs	098	032	025	097		105	073	085	051	

*Decimal points omitted

Factor Designations

Elder's Occupational - Educational Status - Chinese Factor II, Malay Factor I

Sibling Size vs Maternal Occupational-Educational Status - Chinese Factor III, Malay Factor III

Paternal Occupational-Educational Status + Material Index - Chinese Factor I

Paternal Occupational-Educational Status - Malay Factor II

Material Index - Malay Factor IV

Home Induction to School Languages - Chinese Factor IV

TABLE 17

KAISER ET AL ROTATED STATUS COSINE VALUES BETWEEN
TARGET FACTOR MATRIX AND ROTATED FACTOR MATRIX

<div> <div>TARGET REFERENCE AXES</div> <div>ROTATED REFERENCE AXES</div> </div>		CHINESE			
		II	III	I	IV
MALAYS	I	<u>1.00</u>	-.20	.05	.53
	III	.18	<u>.97</u>	.20	.06
	II	.12	.14	<u>.83</u>	.65
	IV	.51	.15	<u>.81</u>	.66

Wealth', and 'Type of House', is highly related to both Malay Factor II and Malay Factor IV. Variable loadings reveal that the main marker variables of Malay Factor II and Malay Factor IV taken together represent the same defining variables of Chinese Factor I. Thus, Malay Factor II is designated as Paternal O-E Status and Malay Factor IV is named as Material Index. The single unrelated Chinese Factor IV is designated as Home Induction to School Languages on the basis that this is the only highly loaded variable on this factor.

Within-Domain Hypotheses Testing

Testing of Within-Ability Domain Hypotheses

Hypothesis 1. This expected the emergent ability-factors underlying the selected test measures in the ability domain to be similar to the predicted ability-factors of Verbal Reasoning, Number Facility, Induction, Flexibility of Closure, Speed of Closure, Spatial + Visualization, and School-achievement for both Chinese and Malay samples.

The extent to which obtained and expected factorial descriptions of the ability domain corresponds for the two ethnic samples will determine whether findings are supportive of this hypothesis. In juxtaposing the hypothesis and the summary on the descriptions of the within-ethnic promax oblique first-order ability patterns and between-ethnic promax oblique first-order ability patterns, the correspondence between the outlined expectations and the equivalent emergent factorial

descriptions is clearly apparent.

Seven equivalent elementary ability-factors defined on the basis of Euro-American norms were expected and this agrees fairly well with the seven distinctively similar elementary ability-factors obtained with both Chinese and Malay samples. Of these seven clearly equivalent ability-factors, four were reproduced from the original five input FEP equivalent elementary ability-factors. These included Number Facility, Flexibility of Closure, Speed of Closure, and Spatial + Visualization. Only the FEP elementary ability-factor of Induction expected on the basis of the input of its describing tests of Letter Sets and Figure Classification did not emerge. Instead these two tests align themselves on different factors in both Chinese and Malay patterns. In the Chinese pattern, Letter Sets loads moderately on Chinese Inductive Reasoning II and Figure Classification distributes its contribution among the Flexibility of Closure factor and the Spatial + Visualization factor. In the Malay pattern, Letter Sets loads moderately on the School-achievement factor while Figure Classification stands out alone as the single test defining the only Malay factor unrelated to any Chinese factors, thereby making it difficult to interpret.

In summing up, the overall picture shows that there is close agreement between the findings and expectations pertaining to the ability-factors underlying the ability domain, and hence Hypothesis 1 is supported.

Hypothesis 2. This predicted that the Chinese School-achievement factor would exhibit sharper differentiation from

all the other ability-factors in the within-Chinese pattern than the Malay School-achievement factor would in the within-Malay pattern.

The within-ethnic pattern intercorrelations and SMCs among ability-factors at the bottom of the Chinese promax oblique first-order ability pattern (Table 5) and Malay promax oblique first-order ability pattern (Table 6) provide information for testing this hypothesis. Sharper differentiation between ability-factors is shown by the lower inter-correlations and lower SMCs among them.

The within-ethnic factor intercorrelations show that rather similar ability-factors appear to correlate with the School-achievement factor for both Chinese and Malay samples. Within the Malay ability pattern the School-achievement factor shows negligible correlations with Spatial + Visualization, Speed of Closure, and Classification. Generally, Chinese School-achievement factor appears to show lower within-ethnic pattern factor intercorrelations than the Malay School-achievement factor shows in its within-pattern factors.

In addition, the SMCs show that Chinese School-achievement is not the ability-factor within the Chinese pattern which exhibits highest multiple correlation with the other within-Chinese pattern factors. In fact its SMC ranks fourth in comparison with the other within-Chinese pattern factors. The same situation does not exist with the Malay School-achievement factor. Malay School-achievement factor shows the highest SMC in comparison with all other within-Malay pattern factors. At the cross-ethnic level of comparison, the magnitude of the SMC

between Chinese School-achievement factor and all other within-Chinese-pattern factors is .227, as against .371 between Malay School-achievement factor and its within-pattern factors.

In summing up, the totality of the above observations point to the sharper differentiation (as indicated by lower correlations between ability-factors) between Chinese School-achievement factor and all other within-Chinese-pattern factors, than between Malay School-achievement factor and all other within-Malay-pattern factors. Hence it may be concluded that the findings support Hypothesis 2.

Testing of Within-Psychosocial Domains Hypothesis.

Hypothesis 3. This expected the variables within each of the three psychosocial domains to pattern differently in the Chinese and Malay samples, though the nature of the difference could not be predicted from the limited information available.

The extent to which the obtained Chinese and Malay factors underlying the variables in the affective, process and status domains agree, will determine whether findings are supportive of this hypothesis.

With respect to the affective domain, three Chinese and Malay factors, interpreted as Acceptance vs Rejection, Psychological Control, and Lax vs Firm Control and identified as equivalent on the basis of high variable loading strengths and high indices of factor similarity have been obtained. Similarly the two factors in the Chinese and Malay process patterns have also been identified to be equivalent and interpreted as Learning Environment and Independence vs Parental School-achievement Motivation. Results on the patterning among the status

variables have revealed that considerable similarity exists across the Chinese and Malay factors. Two clearly equivalent factors, interpreted as Elder's O-E Status and Sibling Size vs Maternal O-E Status exist across the Chinese and Malay promax oblique first-order status patterns. The two remaining Malay status-factors of Paternal O-E Status and Material Index represent the fission products of the Chinese status-factor, Paternal O-E Status + Material Index. Only the Chinese status-factor, Home Induction to School Languages, may be considered to be unrelated to any Malay status-factor. Thus it may be concluded that these findings do not support Hypothesis 3.

CHAPTER VIII

ANALYSIS II - BETWEEN-DOMAINS RELATIONS AND HYPOTHESIS TESTING

Relating Ability Domain and Each of Three Psychosocial Domains

Arising from the existence of some ethnic variations in the factorial compositions of the ability domain and status domain, it was decided that the between-domain relationships should be examined with the ethnic variants included. Measures in the ability and each of the 3 psychosocial domains for each subject were obtained by computing scores on each factor in the associated ethnic pattern. This was carried out by using appropriate quantities in the regression equation below:

$$F = S'R^{-1}Z \quad (\text{Mulaik, 1972; p. 323})$$

where F = (nxN) matrix of factor scores

S = (nxr) factor structure matrix

R = (nxn) correlation matrix

Z = (nxN) standardized score matrix

n = number of variables

r = number of factors

and N = number of subjects

For each ethnic sample, inter-domain correlations were computed for each constituent factor in each of these three pairs of inter-domains - ability-affective, ability-process, and ability-status. Table 18 presents the inter-domain correlations for the Chinese sample and Table 19 those for the Malay sample. Two-tailed tests of significance were applied and the level was set at .05. Since the magnitude of the

TABLE 18
INTERCORRELATIONS^a BETWEEN ABILITY-FACTORS
(COLS.) AND AFFECTIVE-FACTORS, STATUS-FACTORS
AND PROCESS-FACTORS (ROWS), FOR THE CHINESE
SAMPLE (N = 144)

ABILITY DOMAIN		ABILITY-FACTORS								
PSYCHOSOCIAL DOMAINS		1	2	3	4	5	6	7	8	9
AFFECTIVE-FACTORS	1	-.117	-.093	-.149	-.226*	-.158	-.061	-.077	-.075	-.063
	2	-.000	-.033	-.091	-.075	-.188*	.036	-.106	-.087	-.036
	3	.081	-.091	.109	.048	.035	.098	.011	.104	.133
STATUS-FACTORS	4	.037	.086	.209*	.174*	.105	-.129	-.057	.041	-.077
	5	.035	.117	.103	.215*	.019	.135	-.055	-.029	.020
	6	.080	-.076	.074	.016	.103	-.053	.194*	.092	.019
	7	-.031	.139	.141	.157	.020	-.030	-.200*	.075	.098
PROCESS-FACTORS	8	-.005	-.084	-.003	.114	-.034	-.114	-.172*	-.046	-.025
	9	.079	-.052	-.048	.023	-.052	-.014	-.103	-.045	.028

^aDecimal points omitted

Critical value of r for significance at .05 level = \pm .161

Factor Designations:

AFFECTIVE-DOMAIN	1 - Psychological Control	1 - Inductive Reasoning I
	2 - Acceptance vs Rejection	2 - Number facility
	3 - Lax vs Firm Control	3 - Verbal Reasoning
	4 - Paternal O-E Status + Material Index	4 - School-Achievement
STATUS DOMAIN	5 - Elder's O-E Status	5 - Flexibility of Closure
	6 - Sibling Size vs Maternal O-E Status	6 - Inductive Reasoning II
	7 - Home Induction to School Languages	7 - Spatial + Visualization
PROCESS DOMAIN	8 - Learning Environment	8 - RPM AB
	9 - Independence vs Parental School-achievement Motivation	9 - Speed of Closure

TABLE 19
INTERCORRELATIONS^a BETWEEN ABILITY-FACTORS
(COLS.) AND AFFECTIVE-FACTORS, STATUS-FACTORS
AND PROCESS-FACTORS (ROWS) FOR THE MALAY
SAMPLE (N = 166)

ABILITY-DOMAIN		ABILITY-FACTORS								
PSYCHOSOCIAL DOMAINS		1	2	3	4	5	6	7	8	9
AFFECTIVE-FACTORS	1	-.118	-.119	-.136	-.053	-.014	.004	-.083	.089	.071
	2	-.004	.067	.011	-.037	-.003	-.042	-.006	-.110	.044
	3	-.077	-.118	-.188*	.054	.024	.064	-.135	.047	.155*
	4	.031	.147	.263*	.119	.057	.007	.060	-.008	-.038
STATUS-FACTORS	5	.145	.132	.262*	.037	.089	.113	.167*	.079	-.045
	6	.179*	.011	-.041	.121	.076	.219*	.105	.065	.169*
	7	.172*	.097	.065	.205*	.196*	.196*	.123	.113	.083
PROCESS-FACTORS	8	.059	.034	.084	.014	-.040	-.020	.114	.052	-.124
	9	-.065	.039	-.064	.041	.064	-.046	.029	.136	-.093

^aDecimal points omitted

Critical value of r for significance at .05 level = $\pm .150$

Factor Designations:

	Rows	Columns
AFFECTIVE-DOMAIN	1 - Psychological Control	1 - Inductive Reasoning I
	2 - Lax vs Firm Control	2 - Inductive Reasoning II
	3 - Acceptance vs Rejection	3 - School achievement
	4 - Elder's Occupational + Educational Status	4 - Number Facility
STATUS DOMAIN	5 - Paternal Occupational + Educational Status	5 - Flexibility of Closure
	6 - Sibling Size vs Maternal O-E Status	6 - Spatial + Visualization
PROCESS DOMAIN	7 - Material Index	7 - Verbal Reasoning
	8 - Learning Environment	8 - Speed of Closure
	9 - Independence vs Parental School-achievement Motivation	9 - Classification

across-domain correlations are rather low, the interpretation of these correlations is focussed on the trends of the between-domain relationships rather than on the strengths of those relationships.

Chinese Ability-Affective Relations

Significant negative correlations exist between School-achievement and Psychological Control, and between Flexibility of Closure and Acceptance vs Rejection. Only these two ability-factors are involved in this inter-domain link. The other affective-factor, Lax vs Firm Control appears to have hardly any relationship with ability-factors.

Chinese Ability-Process Relations

The relation between ability-factors and process-factors is a relatively weak one. Only one ability-factor, Spatial + Visualization, shows a significant correlation with Learning Environment (negatively).

Chinese Ability-Status Relations

Three ability-factors (Verbal Reasoning, School-achievement and Spatial + Visualization) show significant correlations with either one or two of the four status-factors. Verbal Reasoning has a relatively high positive correlation with Paternal O-E Status + Material Index. School-achievement relates significantly to Paternal O-E Status + Material Index and Elder's O-E Status. Spatial + Visualization correlates significantly with Sibling Size vs Maternal O-E Status (positively) and Home Induction to School Languages (negatively).

Chinese Relation of Familial Psychosocial Circumstances to Ability-factors

In summing up, the across-domain zero-order correlation results show that 4 out of the 9 ability-factors in the Chinese ability domain are associated with 7 of the total 9 psychosocial-factors in the affective, process, and status domains. These four significantly related ability-factors are School-achievement, Verbal Reasoning, Spatial + Visualization, and Flexibility of Closure. The seven significantly correlated psychosocial-factors include two affective-factors (Psychological Control and Acceptance vs Rejection), one process-factor (Learning Environment), and all the four status-factors. These significantly correlated ability-factors and affective-, process-, and status-factors are extracted from Table 18 and displayed in Table 20.

Malay Ability-Affective Relations

Only the affective-factor, Acceptance vs Rejection appears to have relevance in the inter-domain link for the Malay sample. Acceptance vs Rejection has a significant negative correlation with School-achievement and positive correlation with the Classification factor.

Malay Ability-Process Relations

Clearly there is hardly any substantial association between the process domain and ability domain for the Malay sample.

Malay Ability-Status Relations

In comparison with the Chinese ability-status relations, the link between the ability domain and status domain for the Malay sample

TABLE 20
SIGNIFICANT CORRELATIONS OF ABILITY-FACTORS
WITH AFFECTIVE-, PROCESS-, AND STATUS-FACTORS
FOR CHINESE AND MALAY SAMPLES

<u>CHINESE</u>			
Ability-Factors	Psychosocial-Factors Factors	Type	Corre- lations
School-achievement	Psychological Control	Affective	-.226
	Elder's O-E Status	Status	.215
	Paternal O-E Status + Material Index	Status	.174
Flexibility of Closure	Acceptance vs Rejection	Affective	-.188
Spatial + Visualization	Sibling Size vs Maternal O-E Status	Status	.194
	Home Induction to School Languages	Status	-.200
	Learning Environment	Process	-.172
Verbal Reasoning	Paternal O-E Status + Material Index	Status	.209
<u>MALAYS</u>			
Ability-Factors	Psychosocial-Factors Factors	Type	Corre- lations
School-achievement	Elder's O-E Status	Status	.263
	Paternal O-E Status	Status	.262
	Acceptance vs Rejection	Affective	-.188
Inductive Reasoning I	Sibling Size vs Maternal O-E Status	Status	.179
	Material Index	Status	.172
Flexibility of Closure	Material Index	Status	.196
Spatial + Visualization	Material Index	Status	.196
	Sibling Size vs Maternal O-E Status	Status	.219
Number Facility	Material Index	Status	.205
Verbal Reasoning	Paternal O-E Status	Status	.167
Classification	Acceptance vs Rejection	Affective	.155
	Sibling Size vs Maternal O-E Status	Status	.169

appears to spread over a larger number of ability-factors. Material Index stands out as the one status-factor that shows significant positive correlation with a wider range of ability-factors though all non-verbal, these being Inductive Reasoning I, Number Facility, Flexibility of Closure and Spatial + Visualization. Sibling Size vs Maternal O-E Status also relates significantly with another cluster of non-verbal ability-factors, namely, Inductive Reasoning I, Spatial + Visualization, and Classification. Paternal O-E Status appears to have relevance only for the verbal ability-factors - School-achievement and Verbal Reasoning. Elder's O-E Status supports the Paternal O-E Status in its relation to School-achievement.

Malay Relation of Familial Psychosocial Circumstances to Ability-factors

In summing up the Malay across-domain relations, it may be stated that the link between familial psychosocial circumstances and ability-factors is mediated primarily through the status-factors. No significant correlation occurs in the ability-process relations and only one affective-factor, Acceptance vs Rejection, is involved in the ability-affective relationship. This results in only five significantly related psychosocial-factors, though the across-domain association extends over a larger number of ability-factors. These affected ability-factors include School-achievement, Verbal Reasoning, Inductive Reasoning I, Flexibility of Closure, Number Facility, Spatial + Visualization, and Classification. The significantly correlated ability-factors and affective-, process-, and status-factors are also shown in Table 20,

together with those for the Chinese sample.

Ability-factors Unrelated to Familial Psychosocial Circumstances

Two equivalent Chinese and Malay ability-factors, Inductive Reasoning II (primarily RPM Sets) and Speed of Closure appear to be resistant to familial psychosocial circumstances for both ethnic samples.

Canonical Relations between Contributory Ability-factors and Psychosocial-factors

It is difficult to obtain a clear picture of the 'patterns' of relationship between the significantly correlated ability-factors and psychosocial-factors from a study of the zero-order correlations in Table 18 and Table 19. To examine the 'patterns' of overall maximum association between these ability-factors and psychosocial-factors, a canonical analysis (Mulaik, 1972; Darlington, 1973) was carried out on these two sets of factors for the Chinese and Malay sample separately. Bartlett's statistical test of significance on the canonical correlations (Darlington, 1973; p. 441), gave two canonical variates which may be considered to be significant for the Chinese and Malay samples. Table 21 presents the Chinese results and Table 22 the Malay results.

In interpreting the results in Tables 21 and 22, the correlations between ability-factors or psychosocial-factors with their respective canonical variates are to be considered analogous to loadings in the interpretation of principal component factor analysis results. For this reason, they are referred to as canonical loadings. Positive and negative signs on the loadings are to be regarded in the same sense as similar signs on factor analysis loadings.

TABLE 21

CANONICAL LOADINGS* FOR THE ABILITY-FACTORS AND
PSYCHOSOCIAL-FACTORS (CHINESE, N=144)

Ability-Factors	Canonical Loadings (Correlations bet. Variables and Canonical Variates)				Psychosocial-Factors
	I	II	I	II	
School-achievement	<u>819</u>	-176	<u>502</u>	-073	Paternal O-E Status + Material Index
Verbal Reasoning	<u>696</u>	-009	<u>471</u>	-286	Elder's O-E Status
Flexibility of Closure	<u>552</u>	<u>400</u>	<u>424</u>	<u>-623</u>	Home Induction to School Languages
Spatial + Visualization	074	<u>927</u>	<u>-647</u>	-159	Psychological Control
			-368	-372	Acceptance vs Rejection
			297	<u>-530</u>	Learning Environment
			179	<u>558</u>	Sibling Size vs Maternal O-E Status
<hr/>					
$R_{c_I} = .396, \quad p_I = .014$			$R_{c_{II}} = .356, \quad p_{II} = .177$		

* Decimal points omitted

TABLE 22

CANONICAL LOADINGS* FOR THE ABILITY-FACTORS AND
PSYCHOSOCIAL-FACTORS (MALAYS, N = 166)

Ability-Factors	Canonical Loadings (Correlations bet. Variables and Canonical Variates)				Psychosocial-Factors
	I	II	I	II	
School-achievement	<u>672</u>	<u>595</u>	<u>475</u>	320	Elder's O-E Status
Verbal Reasoning	205	<u>589</u>	<u>473</u>	<u>631</u>	Paternal O-E Status
Classification	<u>-491</u>	245	<u>-644</u>	-146	Acceptance vs Rejection
Spatial + Visualization	-305	<u>709</u>	<u>-494</u>	<u>627</u>	Sibling Size vs Maternal O-E Status
Number Facility	-204	<u>567</u>	-282	<u>657</u>	Material Index
Flexibility of Closure	-104	<u>508</u>			
Inductive Reasoning I	-014	<u>700</u>			
<hr/>					
$R_{c_I} = .440, p_I = .001$			$R_{c_{II}} = .353, p_{II} = .121$		

* Decimal points omitted

Chinese Ability-Psychosocial Canonical Relations. Two main underlying dimensions are common to both the ability-factors and psychosocial-factors. With respect to the ability-factors, one dimension includes the verbal-educational ability-factors, predominantly School-achievement and Verbal Reasoning and the other dimension represents primarily the spatial-perceptual ability-factors of Spatial + Visualization and Flexibility of Closure. At the level of the first canonical variate, School-achievement, Verbal Reasoning, and Flexibility of Closure are interpreted as relating to the status-factors of Paternal O-E Status + Material Index, Elder's O-E Status, Home Induction to School Languages and Psychological Control. With respect to the second canonical variate, Spatial + Visualization, and Flexibility of Closure are associated positively with Sibling Size vs Maternal O-E Status and negatively with Home Induction to School Languages and Learning Environment.

Malay Ability-Psychosocial Canonical Relations. The 'pattern' of relationships here appears to single out School-achievement as having a particular dimension of relationship over and above the total common relationship that all ability-factors have with the group of psychosocial-factors. Thus, with reference to the first canonical variate, School-achievement vs Classification-Spatial + Visualization is associated with Elder's O-E Status, Paternal O-E Status, Acceptance vs Rejection and Sibling Size vs Maternal O-E Status. The second canonical level of relationship shows that a syndrome of three economically-oriented status-factors, Material Index, Paternal O-E Status, and Sibling Size vs Maternal O-E Status, appears to relate substantially to

almost the whole domain of ability-factors - Spatial + Visualization, Inductive Reasoning I, School-achievement, Verbal Reasoning, Number Facility, and Flexibility of Closure. Thus, with respect to the ability-factors, the Malay first canonical dimension may be viewed as analogous to a bipolar factor, School-achievement vs Spatial-perceptual while the Malay second canonical dimension appears to imply a 'g' factor.

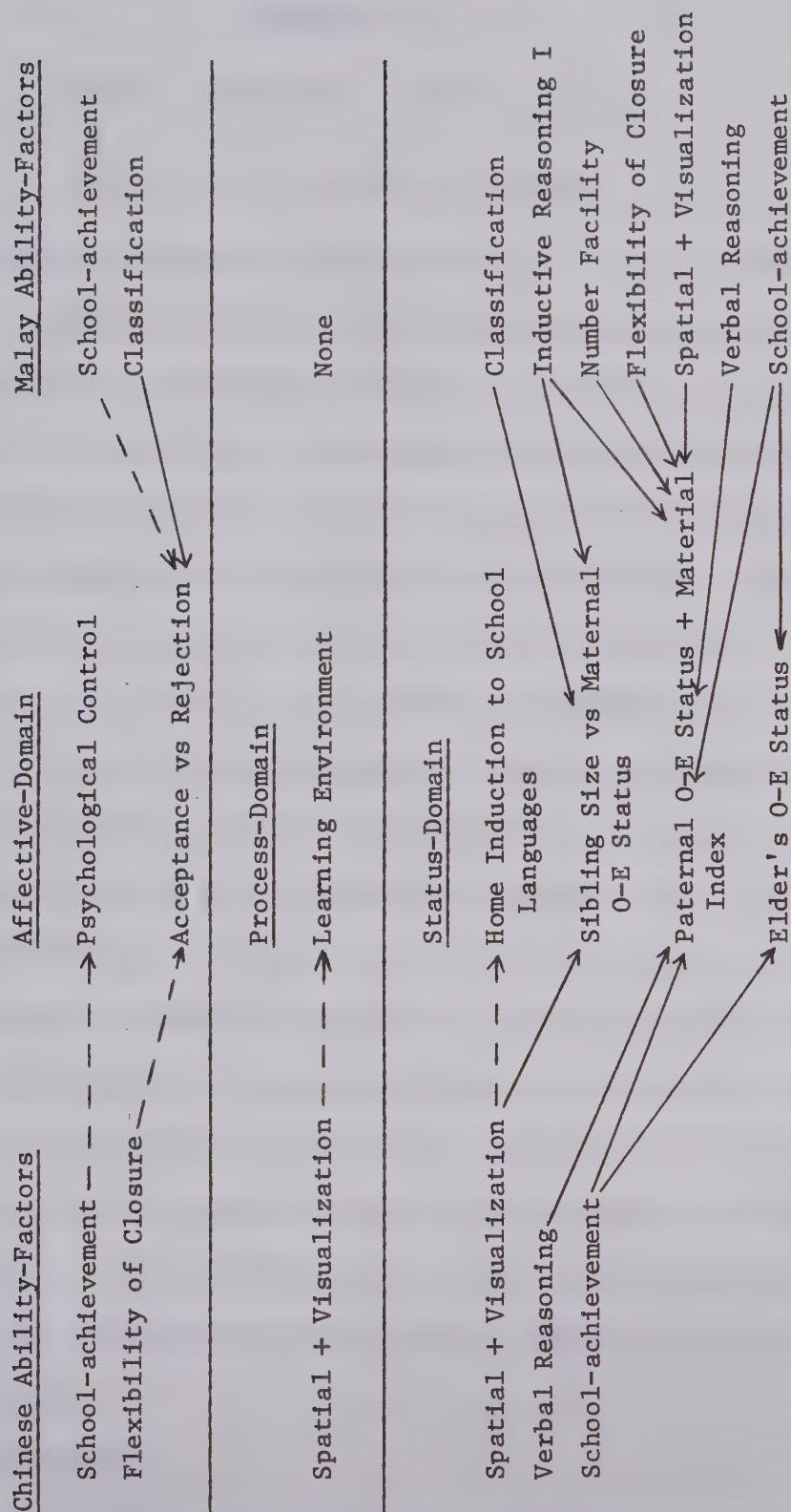
Between-Domain Hypothesis Testing

Hypothesis 4. This expected that relative to the affective and status domains, the process domain would be more closely associated with the School-achievement and Verbal Reasoning factors.

The inter-domain relations for the Chinese and Malay samples, as indicated by significant correlations between domain factors are diagrammatically summarized in Figure 4. It is evident from Figure 4 that there is relatively no substantial relationship between the process domain and the School-achievement, and Verbal Reasoning factors for both the Chinese and Malay samples. In this respect, the findings are incompatible with Hypothesis 4 and hence it has not been supported.

FIGURE 4

SIGNIFICANTLY RELATED ABILITY-FACTORS
AND AFFECTIVE-, PROCESS-, AND STATUS-FACTORS
FOR CHINESE AND MALAY SAMPLES



CHAPTER IX

SUMMARY, DISCUSSION, AND IMPLICATIONS

Summary and Discussion of Findings

The two main purposes of this study were: 1a) to investigate the patterns in a domain of school-related elementary ability-factors across two samples of Singapore Chinese and Malay boys of age between 13+ and 14+, with reference to Euro-American defined ability-factors which have been established as relatively stable for schooling subjects, and which are compatible with abilities generally used in Euro-American investigations into the relations of familial psychosocial circumstances to abilities, b), c), and d) to similarly investigate factor patterns in affective, process, and status domains of familial psychosocial circumstances, with reference to those which Euro-American studies have consistently identified as correlates of abilities; and 2) to examine how the ability-factors relate to the affective-, process-, and status-factors. Underlying these two aspects of the study is the overall purpose of investigating the relation of familial psychosocial circumstances to ability-factors under varying conditions of interplay between the home and school in fostering these ability-factors. The findings on these two parts of the study have been presented in the two preceding chapters. This chapter will draw together a summary of these findings and discuss them.

Within-Domain Patterns

Chinese and Malay Ability-patterns. Seven clearly equivalent

ability-factors and one seemingly similar ability-factor have been identified across the Chinese and Malay patterns of 9 factors each. The remaining unrelated factor in each pattern could not be interpreted psychologically because of their limited number of defining test measures, hence they were named after the main defining test measures. The eight related factors were interpreted as Inductive Reasoning I, Number Facility, Flexibility of Closure, Speed of Closure, Spatial + Visualization, Inductive Reasoning II, Verbal Reasoning, and School-achievement. The hypothesis that the emergent ability-factors for both ethnic samples would resemble the input elementary ability-factors defined by the selected test measures was confirmed though some tests did behave contrary to expectation. Four out of the five input French, Ekstrom, and Price (FEP) elementary ability-factors were reproduced. These reproducible FEP elementary ability-factors of Number Facility, Flexibility of Closure, Speed of Closure, and Spatial + Visualization represented 4 of the 7 in Royce's (1973) list of most stable elementary ability-factors. Though the ability-factors were relatively independent within each ethnic pattern, the factor intercorrelations within the Malay pattern tended to be higher than those within the Chinese pattern. This result is consonant with Ferguson's explanation on the relation between mastery level and differentiation of ability-factors, as shown by the Chinese and Malay differences in performance level on the test measures (Appendix V). The relatively higher SMCs for the School-achievement factor in both Chinese and Malay patterns adds credibility to the original rationale of describing this domain as comprising

school-related abilities. However, there is ethnic variation in the differentiation of School-achievement from the other within-ethnic pattern factors. The hypothesis that Chinese School-achievement factor would exhibit a sharper differentiation from its within-pattern factors than Malay School-achievement factor would, was supported by the result that Chinese School-achievement factor has a within-ethnic pattern SMC rank order of 4 while Malay School-achievement factor has the highest SMC in the Malay pattern. Across-pattern comparison shows that Malay School-achievement has a SMC value of .371, as against Chinese School-achievement factor's value of .227.

These within-ability domain findings appear to be compatible with Euro-American findings. Because of their comparable age range, social class membership and uniformity of exposure to Euro-American type of education, both the Chinese and Malay samples exhibited rather similar ability patterning, and the nature of the emergent factors turned out to match Euro-American defined factors, too. The variation in differentiation of the factors between the Chinese and Malay samples cannot be accounted for by differences in social class membership, age or type of education, as these have been made comparable for both samples. This variation seems to reflect the general observation that the Chinese pupil has a strong motivation for school learning, relative to his Malay counterpart. The Chinese pupils' strong motivation for school learning may be the result of germane Chinese cultural characteristics such as those observed by Hunter (see Section on Samples). This seems to be supported by the lack of ethnic difference in the subjects'

perceptions of parental press for School-achievement (Appendix VII).

Chinese and Malay Affective-patterns. The three original factors that Schaefer's Children's Report of Parent Behaviour Inventory (CRPBI) claimed to tap - Psychological Control, Acceptance vs Rejection, and Lax vs Firm Control, turned out to be equivalent to the three emergent factors in the Chinese and Malay affective-patterns separately. This result has extended the cross-cultural validity of Schaefer's CRPBI to non-Euro-American groups, and suggests that children of contrasting cultural groups describe similar patterns of parental behaviours. The general observation that Chinese parents are stricter in their control of their children appears to be reflected in the significant differences found in scores on the scales between Chinese and Malay subjects' reports of maternal behaviour (Appendix VII).

Chinese and Malay Process-patterns. Two equivalent Chinese and Malay process-factors - Learning Environment and Independence vs Parental School-achievement Motivation represented the factorial constituents of the process domain. The Learning Environment factor appears to concur with the major underlying factor which has consistently emerged within a domain of the Chicago-type of process variables (Dave, 1963; Wolf, 1964b; Dyer, 1967; Marjoribanks, 1970).

Chinese and Malay Status-patterns. Some slight ethnic variation occurred among the four identified status-factors of each ethnic pattern. Two clearly equivalent factors - Elder's Occupational-Educational (O-E) Status and Sibling Size vs Maternal Occupational-Educational Status were identified. The remaining two Malay factors, Paternal

Occupational-Educational Status and Material Index appeared to represent components of the Chinese factor, Paternal Occupational-Educational Status + Material Index. This Chinese Paternal O-E Status + Material Index factor resembles the major factor underlying Dyer's (1967) six status variables of parental education, parental occupation, family income, location of residence, type of residence, and quality of furnishings. The splitting between Malay Paternal O-E Status and Material Index may be attributed to the fact that most of the Malay mothers in this sample were working, though at low occupational status jobs, to supplement the father's income while most of the Chinese mothers were housewives. That the Chinese factor, Home Induction to School Languages, has no Malay parallel may be explained by the fact that for all Malays, one of the school languages is still the home language while this is not the case for the Chinese.

The variable patternings within each ethnic domain appear to reflect the realistic clusterings. In particular, the bipolar factor Sibling Size vs Maternal O-E Status mirrors the current Singapore trend that mothers of high educational and occupational status tend to have a smaller number of children.

The hypothesis that the variable-factors within each domain of affective, process, and status variables would vary across the Chinese and Malay samples was not supported by the findings.

Between-Domain Relations

For both Chinese and Malay samples, the across-domain relations for each of the domain-pairs - ability-affective, ability-process, and

ability-status, appear to be rather weak, as indicated by both the low and few significant intercorrelations. The factors which contribute to significant across-domain relations are represented in Figure 4.

There is ethnic variation in the ability-affective inter-domain relations - the same ability-factor either relates to different affective-factors in the ethnic samples or the same affective factor relates to different ability-factors. For example, School-achievement is associated with Psychological Control in the Chinese case but with Acceptance vs Rejection in the Malay case. At the same time, Acceptance vs Rejection is linked to Flexibility of Closure in the Chinese sample but to School-achievement and Classification in the Malay sample. With respect to the ability-process domain-pair, no relationship exists for the Malay sample, and only Spatial + Visualization relates negatively to Learning Environment in the Chinese sample.

In the ability-status domain-pair, Paternal O-E Status and Elder's O-E Status appear to be of important relevance to School-achievement and Verbal Reasoning for both Chinese and Malay samples. That these two status-factors turned out to be associated with School-achievement is in agreement with the cultural characteristics of these two groups. High Paternal O-E Status with high Elder's O-E Status would mean high family prestige. It will be recalled that through subtle cultural transmission processes, the Chinese or Malay child learns that he has a responsibility to keep up the family image. It follows from this that the responsibility would be more pressing on a child from a high O-E status family and consequently he would be driven to accomplish better

school-achievement . Also fathers and other family members with high O-E status would tend to have more intellectually-oriented values and attitudes which the child might pick and internalise as his own without any conscious or deliberate verbal communication from them. A distinct ethnic contrast occurs with respect to the Material Index factor in the Malay data. This status-factor is associated with a rather large number of non-verbal abilities in the Malay sample, but the Chinese factor of which the Malay Material Index is a component shows no association with any non-verbal ability-factors. This distinctive Malay feature may be attributed to the fact that the availability of mass communication such as radio and T.V. may have greater impact on the more rural-oriented Malay child than the more urban-oriented Chinese child.

The hypothesis that relative to the affective-and status-factors, the process-factors would be more closely associated with the School-achievement factor and Verbal Reasoning factor was found to be incompatible with both Chinese and Malay results. This is in contrast to the stronger link between School-achievement and verbal abilities often found in Euro-American settings (Plowden et al, 1967; Marjoribanks, 1970; Jones, 1972). The Chinese and Malay concurrence on the relations between School-achievement, and Verbal Reasoning and the status- and process-factors is consonant with a main position of this study - that the link between school-fostered ability-factors and the process-factors may be confounded by the counterbalancing effects of the child's own contribution to the school processes of learning.

The significant negative correlation between Chinese School-achievement and Psychological Control, and between Malay School-achievement and Acceptance vs Rejection suggest that the impact of these two broad dimensions of maternal behaviours have different effects on school-achievement for the two samples. It is interesting to note that the Flexibility of Closure factor which include Witkin's Embedded Figures Test, has significant negative correlations with Psychological Control and Acceptance vs Rejection for the Chinese sample. This agrees with Witkin's thesis that too much maternal control negates field-independence, a measure of which is the Group Embedded Figures Test.

The overall relationship between the two sets of significant ability-factors and combined affective-, status-, and process-factors were examined through canonical analysis. For both ethnic samples two underlying dimensions common to the ability-factors and psychosocial-factors were found. With respect to the Chinese sample, the two levels of relationship distinguished the relating ability-factors into the verbal-educational (v:ed) and spatial-perceptual (k:m) abilities. In the case of the Malay sample, School-achievement was distinguished as having a stronger association over and above the total ability-factor link with the relating psychosocial-factors. Both Chinese and Malay results indicated that the link between School-achievement and Paternal O-E Status and Elder's O-E Status constitute the strongest across-domain link. On a cross-ethnic basis, the Malay cross-domain association is stronger than the Chinese, as is indicated by the higher first canonical correlation of the Malays. This was expected on the basis

that the Chinese pupils' greater motivation would lead to greater counterbalancing school effects than would be the case for the Malay child.

Significant Findings of this Study

An overview of the results shows that clear factor patterns within each of the four domains - ability, affective, process and status, have emerged for both Chinese and Malay data. There is considerable factor similarity among corresponding Chinese and Malay patterns. In addition, many of the isolated factors resemble those predicted on the basis of Euro-American findings. The reproducibility of the FEP elementary ability-factors and the Schaefer broad dimensions of parent behaviours are cases in point.

A major finding of this study that does not correspond to those of Euro-American studies is the tenuous across-domain relationship. Very little relationship has been found for both ethnic samples in each of the domain-pairs, -ability-affective, ability-process, and ability-status, as indicated by the low across-domain correlations and canonical correlations. The most predictable ability-factors are School-achievement and Spatial + Visualization, but the main predictors are status factors, namely Paternal O-E Status, Elder's O-E Status and Material Index. No substantial relationship exists between the process-factors and ability-factors.

Implications

Implications for Theory

The results on the ability patterns of the Chinese and Malay

samples are consonant with results obtained with other non-Euro-American subjects who have been exposed to comparable Euro-American education and acculturation. The reproducibility of the FEP elementary factors of Flexibility of Closure, Speed of Closure, Number Facility, and Spatial + Visualization adds further support for the stability of these factors across diverse cultural groups. While group differences on the patterning of abilities have demonstrated that ability differentiation is inextricably linked with the specific experience the individual encounters in the course of development, the results in this study show that it is also determined by the organism's own contribution to the learning situation. The Chinese and Malay samples have been equated on age, socio-economic class, and type of schooling, but they still differed on the degree of differentiation among the ability-factors which was attributed to their differences in motivational response to school learning.

Instances of some tests, in particular, Letter Sets and Classification, aligning themselves on different factors across the two ethnic patterns indicate that it is misleading to use single tests or groups of tests to represent similar ability-factors across different groups.

The emergence of three equivalent Chinese and Malay affective-factors underlying the scales of the CRPBI - Psychological Control Acceptance vs Rejection, and Lax vs Firm Control, which resemble closely the three dimensions obtained with Euro-American subjects (American subjects by Schaefer and French-Belgian subjects by Renson), extends the cross-cultural validity of the CRPBI to non-Euro-American cultures.

Furthermore, it suggests probable cross-cultural generality in children's organizations of their perceptions of parent behaviours.

Though the Chinese results on the link between the Flexibility of Closure factor and Psychological Control and Acceptance vs Rejection is consonant with Witkin and his colleagues' findings on the relationship between maternal control in child-rearing and field-independence, the cross-cultural generality is questioned by the non-relationship between Flexibility of Closure and any of the affective-factors for the Malay case.

The across-domain relation results suggest that there are two facets of the relationship between familial psychosocial circumstances and ability-factors. One appears to focus more directly on the ability-factors while the other focusses more on the individual as an intermediary. Consider the case of the clear link between the process domain and verbal abilities consistently found in Euro-American studies. In this instance the home practices impinge directly on the individual to draw out the manifestation of the abilities. In the case of the link between School-achievement and the status-factors of Paternal O-E Status and Elder's O-E Status for the Chinese and Malay samples of this study, these status-factors do not provide the stimulating and eliciting environment for the School-achievement factor, but they incite the motivation of the child who being thus armed with a high motivational level was able to respond more optimally to the learning environment of the school. It is this active involvement of the individual that facilitates the emergence of the School-achievement factor.

The findings of this study do not indicate the impotence of familial psychosocial circumstances to ability-factors but draw attention to the fact that the relation of familial psychosocial circumstances to ability-factors has to be viewed in the context of the relative interplay between the home and school. In the Euro-American situation where the school supplements the home in fostering the development of abilities, the relationship between familial psychosocial circumstances and ability-factors has been found to be strong. In the case of these two samples, the tenuous relationship between ability factors and familial psychosocial circumstances reflects the loose links between the home and school in fostering the development of the verbal-educational abilities.

Implications for Practice

A major finding of this study is the weak relationship between familial psychosocial circumstances and ability-factors. This has notable implications for practice in that it points to the potency of schooling. It implies that school effects are much more independent of home circumstances than what have been usually found in Euro-American settings. At a more general level, it indicates that irrespective of the nature of the homes, Euro-American type of education can be implemented in schools. It has a practical value particular to Singapore in that the schools can forge ahead with the task of teaching the skills necessary for the country's growth and advancement towards more sophisticated technology without having to wait for home pressures toward Euro-American type of education to develop.

Another noteworthy implication for practice suggested in this

study is that facet of relationship between familial psychosocial circumstances and ability-factors that provides the individual with the impetus to optimize his own contribution to the learning process. All too often, deficits in opportunities and experiences are more readily compensated for in the school but very little attention has been accorded to motivational deficits. To facilitate his own teaching and improve pupils' mastery level, the teacher should check on the pupils' motivational make-up. For pupils who lack the motivational equipment for learning, greater effort and attention must be directed at inculcating in them the interest and responsibility to learn.

Though the results of this study do not show a strong link between familial psychosocial circumstances and abilities, this should not be interpreted that teachers of rural school children need not design, organize and administer the school learning environment in terms of more enriching and variegated experiences that would widen the horizons of the rural-oriented vistas of the children in their charge. On the contrary, the weak link presents a stronger case for the need to do so.

Parents and teachers should also be cognizant of the fact that too much Psychological Control or over-emphasis on Acceptance vs Rejection appear to have a negative effect on School-achievement. Because there is ethnic variation in the relation of these two affective-factors to School-achievement, Singapore teachers' dealings with Chinese and Malay pupils will have to be adapted to the nature of this variation.

Implications for Research

This study has been conducted on restricted samples of the Chinese and Malay male pupils in Singapore and as such the findings cannot be

generalized to all Singapore Chinese and Malay male pupils. It is probable that the historical socio-cultural differences between the two ethnic groups might have been phased out among the high socio-economic groups and hence findings within these groups would have yielded different results.

More information pertaining to the link between familial psychosocial circumstances and ability-factors may be obtained from studies carried out on female subjects. In Singapore the demarcation between the social roles of the two sexes are not as sharp as those in Euro-American culture, hence the findings on female pupils could reflect this.

The durability of the link between familial psychosocial circumstances to ability-factors with advancing years also needs future investigation. Most Euro-American studies have been carried out with children in the pre-school age period or early years of schooling. Their results have indicated a stronger association between ability-factors and familial psychosocial circumstances than those obtained in this study. This variation in results may be attributed to the age variant, hence there is a need to replicate this study with children of both younger and older age groups.

Another direction that further research can take is to replicate this study with Singapore male pupils of this age group who come from English-speaking homes only, or Chinese male pupils who are receiving the Chinese-medium of education. The outcomes of such studies would provide information to support or challenge the position taken by this study - the relationship between familial psychosocial circumstances and ability-factors depends on the interplay between the home and school.

REFERENCES

- Ahmavaara, Y. On the unified factor theory of mind. Annals of the Finnish Academy of Science, Series B106, Helsinki, Finland. 1957.
- Anastasi, A. On the formation of psychological traits. American Psychologist, 1970, 25(10), 889-910.
- Bayley, N. & Schaefer, E.S. Correlations of maternal and child behaviours with meaningful development of mental abilities: Data from the Berkeley Growth Study. Monographs of the Society for Research in Child Development, 1964, 29, No. 97.
- Bayley, N. Behavioural correlates of mental growth: Birth to 36 years. American Psychologist, 1968, 23, 1-17.
- Bayley, N. Research in child development: A longitudinal perspective. In Sears, P.S. (Ed.), Intellectual development. John Wiley & Sons, Inc. New York. London. 1971. Pp. 14-40.
- Bing, E. Effect of child-rearing practices on development of differential cognitive abilities. Child Development, 1963, 34, 631-648.
- Bloom, B.S. Stability and change in human characteristics. New York: John Wiley & Sons, Inc., 1964.
- Burt, C. The structure of the mind. British Journal of Educational Psychology, 1949, 19, 100-111, 170-199.
- Carroll, J.B. Factors of verbal achievement. In Anastasi, A. (Ed.), Testing problems in perspective. Washington, D.C.: American Council on Education, 1966. Pp. 406-413.
- Cattell, R.B. Theory of fluid and crystallized intelligence; A critical experiment. Journal of Educational Psychology, 1963, 54, 1-22.
- Cattell, R.B. The meaning and strategic use of factor analysis. In Cattell, R.B. (Ed.), Handbook of multivariate experimental psychology. Rand McNally & Company, Chicago. 1966. Pp. 174-243.
- Cattell, R.B. Abilities: Their structure, growth and action. Boston: Houghton Mifflin. 1971.
- Crites, J.O. & Sembler, I.J. Adjustment, educational achievement, and vocational maturity as dimensions of development in adolescence. Journal of Counseling Psychology, 1967, 14, 489-498.

- Darlington, R.B., Weinberg, S.L. and Walberg, H.J. Canonical variate analysis and related techniques. Review of Educational Research 1973, 43(4), 433-454.
- Dave, R.H. The identification and measurement of environmental process variables. Unpublished Ph.D. thesis, University of Chicago, 1963.
- Dockrell, W.B. Cultural and educational influences on the differentiation of ability. In Proceedings of the 73rd Annual Convention of the American Psychological Association. Washington, D.C. APS, 1965. (Summary)
- Douglas, J.W.B. The home and the school. London: Mac-Gibbon and Kee. 1964
- Douglas, J.W.B., Ross, J.M. and Simpson, H.R. All our future, London: Peter Davis, 1968.
- Dyer, R.H. The effects of environmental variables on the achievement of elementary school children in Trinidad. Unpublished thesis, University of Alberta, 1967.
- Dyk, R.B. and Witkin, H.A. Family experiences related to the development of differentiation in children. Child Development, 1965, 38(2), 21-55.
- El-Abd, H.A. The intellect of East African students. Multivariate Behavioural Research, 1970, 5(1), 423-433.
- Ferguson, G.A. On learning and human ability. Canadian Journal of Psychology, 1954, 8, 95-112.
- Ferguson, G.A. On transfer and the abilities of man. Canadian Journal of Psychology, 1956, 10, 121-131.
- Ferguson, L.R. and Maccoby, E.E. Interpersonal correlates of abilities. Child Development, 1966, 37, 549-571.
- Filella, J.P. Educational and sex differences in the organization of abilities in technical and academic students in Columbia, South America. Genetic Psychological Monographs, 1960, 61, 115-163.
- Flores, M.B. and Evans, G.T. Some differences in cognitive abilities between selected Canadian and Filipino students. Multivariate Behavioural Research, 1972, 7(2), 175-191.
- Fraser, E.D. Home environment and the school. London: London University Press. 1959.
- French, J.W. The description of aptitude and achievement tests in terms of rotated factors. Chicago: University of Chicago Press. 1951.

- French, J.W., Ekstrom, R.B. and Price, L.A. Manual for kit of reference tests for cognitive factors. Princeton, N.J., Educational Testing Service. 1963.
- Gagné, R.M. Contributions of learning to human development. Psychological Review, 1968, 75(3), 175-191.
- Garber, M. and Ware, R.B. Relationship between measures of home environment and intelligence test scores. Proceedings of the 78th Annual Convention of the American Psychological Association, 1970, 58, 647-648.
- Hakstian, A.R. and Cattell, R.B. The checking of primary ability structure on a broader basis of performances. British Journal of Educational Psychology, 1974, 44(2), 140-154.
- Harman, H.H. Modern factor analysis. Second edition, revised. Chicago: The University of Chicago Press. 1967.
- Harris, C.W. On factors and factor scales. Psychometrika, 1967, 32, 363-379.
- Hebb, D.O. The organization of behaviour. New York: Wiley. 1949.
- Heim, A.W. Manual for the group test of general intelligence AH4. London: National Foundation for Educational Research. 1955.
- Hendrikson, A.E. and White, P.O. Promax: A quick method for rotation to oblique simple structure. The British Journal of Statistical Psychology, 1964, 17, 65-70.
- Hill, J.P. Similarity and accountance between parents and sons in attitudes toward Mathematics. Child Development, 1967, 38, 777-791.
- Honzik, M.P. Environmental correlates of mental growth: Prediction from family setting at 21 months. Child Development, 1967, 38, 337-364.
- Horn, J.L. and Cattell, R.B. Refinement and test of the theory of fluid and crystallized intelligence. Journal of Educational Psychology, 1966, 57, 253-270.
- Horn, J.L. Integration of structural and developmental concepts in the theory of fluid and crystallized intelligence. In Cattell, R.B. (Ed.), Handbook of multivariate experimental psychology. Chicago: Rand McNally. 1966. Pp. 553-562.
- Horn, J.L. Intelligence - Why it grows, why it declines? Trans-action, 1967, 5(1), 23-31.
- Horn, J.L. Organization of abilities and the development of intelligence. Psychological Review, 1968, 75, 242-259.

- Horn, J.L. Organization of data on life-span development of human abilities. In Goulet, L.R. and Baltes, P.B. (Eds.), Life-span developmental psychology: Research and theory. New York, London. Academic Press. 1970. Pp. 423-466.
- Horn, J.L. The structure of intellect: primary abilities. In Dreger, R.M. (Ed.), Multivariate personality research. Baton Rouge, La.: Claitor. 1972. Pp. 451-511.
- Horn, J.L. Human abilities: A review of research and theory in the early 1970's. Unpublished manuscript, 1975. (Long draft of article prepared for Annual Review of Psychology).
- Hunter, G. South-east Asia - Race, culture and nation. London. New York. Kuala Lumpur. Oxford University Press. 1966.
- Hurley, J.R. Parental acceptance-rejection and children's intelligence. Merrill-Palmer Quarterly, 1965, 11, 19-31.
- Inhelder, B. and Piaget, J. The early growth of logic in the child. New York: Harper and Row. 1964.
- Irvine, S.H. Factor analysis of African abilities and attainments: Constructs across cultures. Psychological Bulletin, 1969, 71, 20-32.
- Jones, P.A. Home environment and the development of verbal ability. Child Development, 1972, 43, 1081-1086.
- Kaiser, H.F., Hunka, S. and Bianchini, J.C. Relating factors between studies based upon different individuals. Multivariate Behavioural Research, 1971, 6(4), 409-421.
- Keeves, J.P. Educational environment and student achievement. Uppsala: Almqvist and Wiksells Boktryckeri AB. 1972.
- Kent, N. and Davis, D.R. Discipline in the home and intellectual development. British Journal of Medical Psychology, 1957, 30, 27-33.
- Kogan, N. Educational implications of cognitive styles. In Lesser, G.S. (Ed.), Psychology and educational practice. Glenview, Illinois: Scott, Foresman & Company. 1971. Pp. 242-292.
- MacArthur, R.S. Mental abilities in a cross-cultural context. Paper presented to the Department of Psychology Colloquium. McGill University, Montreal, 1966.
- MacArthur, R.S. Some differential abilities of Northern Canadian native youth. Paper presented at International Union of Psychological Science Conference on Field Tests for Psychological Performance, London, England, September, 1967.

- MacArthur, R.S. Cognitive strengths of Central Canadian and North-west Greenland Eskimo adolescents. In G.A. Ferguson (Chm.) The development of cognitive abilities. Symposium presented at Canadian psychological Association, Victoria, B.C., June, 1973. (a)
- MacArthur, R.S. Some ability patterns: Central Eskimos and Nsenga Africans. International Journal of Psychology, 1973, 8(4), 239-247. (b)
- MacArthur, R.S. Some Inuit and Indian assets. In W. Coons (Chm.) Individual, language, and society. Symposium presented at Canadian Psychological Association, Windsor, Ontario, June, 1974. (a)
- MacArthur, R.S. Differential ability patterns: Inuit, Nsenga, and Canadian Whites. Paper presented at Second Meeting of International Association for Cross-Cultural Psychology, Kingston, Canada, August, 1974. (b)
- Marjoribanks, K. Ethnic and environmental influences on levels and profiles of mental abilities. Unpublished Ph.D. thesis, University of Toronto, 1970.
- Messick, S. Measures of cognitive styles and personality and their potential for educational practice. In Ingenkamp, K. (Ed.), Developments in educational testing. Vol. 1. London: University of London Press Ltd. 1969. Pp. 329-341.
- Messick, S. Beyond structure: In search of functional models of psychological processes. Psychometrika, 1972, 37(4), 357-375.
- Mosychuk, H. Home environment and mental ability patterns. Unpublished Ph.D. thesis, University of Alberta, 1969.
- Mulaik, S.A. The foundations of factor analysis. New York: McGraw-Hill Book Company. 1972.
- Pedersen, F.A. and Wender, P.H. Early social correlates of cognitive functioning in six-year-old boys. Child Development, 1968, 39, 185-193.
- Phua, S.L. A standardization and validation study of the Raven's Standard Progressive Matrices, Part I: A normative description. Research and Statistics Unit, Ministry of Education, Singapore, R.C. 5, 1971.
- Plowden, B. et al Children and their primary schools. Report of the Central Advisory Council for Education (England). 1967. London: H.M.S.O.

- Radin, N. Parent-child interaction and the intellectual functioning of four-year-old boys. Developmental Psychology, 1972, 6, 353-361. (a)
- Radin, N. Three degrees of maternal involvement in a preschool program: Impact on mothers and children. Child Development, 1972, 43, 1355-1364. (b)
- Raven, J.C. Progressive matrices. London: H.K. Lewis, Ltd. 1956.
- Renson, G.J., Schaefer, E.S. and Levy, B.I. Cross-national validity of spherical conceptual model for parent behaviour. Unpublished study of the National Institute of Mental Health, Rockville, Maryland. 1965.
- Royce, J.R. The conceptual framework for a multi-factor theory of individuality. In J.R. Royce, (Ed.), Contributions of multivariate analysis to Psychology theory. London: Academic Press, 1973, Pp. 305-408.
- Schaefer, E.S. and Bayley, N. Maternal behaviour, child behaviour, and their intercorrelations from infancy through adolescence. Monographs of the Society for Research in Child Development, 1963, 28, 87.
- Schaefer, E.S. Children's reports of parental behaviour: An inventory. Child Development, 1965, 36, 413-424.
- Schwarz, P.A. and Krug, R.E. Ability tests and cultural factors: A Handbook of Principles and Techniques. New York: PRAEGER. 1972.
- Spearman, C. The abilities of man. London: Macmillan. 1927.
- Swift, D.F. Family environment and 11+ success: Some basic predictors. British Journal of Educational Psychology, 1967, 37, 10-21.
- Tatsuoka, M.M. Multivariate analysis. New York: John Wiley & Sons, Inc. 1971.
- Thurstone, L.L. Multiple factor analysis. Psychological Review, 1931, 38, 406-427.
- Thurstone, L.L. Primary mental abilities. Psychometrika, 1938, Monograph 1.
- Tucker, L. A method for synthesis of factor analytic studies. PRS Report No. 948, Department of the Army: Adjutant General's Office, Personal Research Section, Washington, D.C. 1951.
- Tucker, L. An inter-battery method of factor analysis. Psychometrika, 1958, 23, 111-136.

- Vandenberg, S.G. The primary mental abilities of South American students: A second comparative study of the generality of a cognitive factor structure. Multivariate Behavioural Research, 1967, 2, 175-198.
- Vernon, P.E. The structure of abilities. London: Methuen & Co. Ltd., 1961.
- Vernon, P.E. Ability factors and environmental influences. American Psychologist, 1965, 20, 723-733. (a)
- Vernon, P.E. Environmental handicaps and intellectual development: Part II and Part III. British Journal of Educational Psychology, 1965, 35, 1-22. (b)
- Vernon, P.E. Environmental influences and mental development. Address presented to the University of Alberta, April, 1965. (c)
- Vernon, P.E. Intelligence and cultural environment. London: Methuen & Co. Ltd. 1969.
- Vernon, P.E. Genes, 'g' and Jensen. Contemporary Psychology, 1970, 15, 161-163.
- Vernon, P.E. Patterns of cognitive abilities. Paper presented at the 53rd Annual Conference of the Western Psychological Association, Anaheim, California, April, 1973.
- Werts, C.E. and Watley, D.J. Paternal influence on the talent development. Journal of Counseling Psychology 1972, 19(5), 367-373.
- Wilson, P.J. A Malay Village and Malaysia. New Haven: Hraf Press. 1967.
- Winer, B.J. Statistical principles in experimental design. Second Edition. New York: McGraw-Hill Book Company. 1971.
- Winterbottom, M.R. The relation of need for achievement to learning experiences in independence and mastery. In Atkinson, J.W. (Ed.), Motives in Fantasy, Action, and Society. Princeton, New Jersey: Van Nostrand. 1958.
- Witkin, H.A. A cognitive-style approach to cross-cultural research. International Journal of Psychology, 1967, 2(4), 233-250.
- Witkin, H.A., Oltman, P.K., Raskin, E.R. and Karp, S.A. Manual for Embedded Figures Tests. Palo Alto, California: Consulting Psychologists Press. 1971.

- Witkin, H.A., Price-Williams, D., Bertini, M., Christiansen, B., Oltman, P.K., Ramirez, M. and Van Meel, J. Social conformity and psychological differentiation. International Journal of Psychology, 1974, 9(1), 11-29.
- Wolf, R.M. The identification and measurement of environmental process variables related to intelligence. Unpublished Ph.D. thesis, University of Chicago, 1964. (a)
- Wolf, R.M. The measurement of environments. Paper presented at the Proceedings of the 1964 Invitational Conference on Testing Problems, 1964. (b)

APPENDIX I

HOME ENVIRONMENT QUESTIONNAIRE

APPENDIX I

HOME ENVIRONMENT QUESTIONNAIREINSTRUCTIONS

I am making a study to find out how pupils' home environments relate to their school achievements and other general skills. I am asking a number of students, including yourself, to give some information about their home environment in this questionnaire.

The information given will not be shown to anyone, and report on any specific pupil will not be made. Please help to make this study a success by giving TRUE answers to all the questions.

"BE SURE TO ANSWER EVERY QUESTION"

NAME: _____

CLASS: _____

SCHOOL: _____

1. How many brothers do you have?
(Don't count yourself) _____
 2. How many sisters do you have?
(Don't count yourself) _____
 3. What is your father's occupation?
(If he has retired, state his
occupation before retirement) _____
 4. State the highest educational level your father has attained.
(Tick the appropriate space)
 - _____ Post-graduate
 - _____ University degree
 - _____ College diploma (e.g. Ngee Ann, Polytechnic, T.T.C.,
or equivalent)
 - _____ H.S.C.
 - _____ Cambridge School Certificate
 - _____ Had some secondary education
 - _____ Completed P.S.L.E.
 - _____ Had some primary education
 - _____ Don't know
- OTHER ANSWER: _____
5. What is your mother's occupation?
(If housewife, state so) _____
 6. What is your mother's highest educational level?
(Tick the appropriate space)
 - _____ Post-graduate
 - _____ University degree
 - _____ College diploma
 - _____ H.S.C.
 - _____ Cambridge School Certificate

☐ Had some secondary education

☐ Completed primary education

☐ Had some primary education

☐ Don't know

OTHER ANSWER: _____

7. What language(s) did you speak before you entered school?
(Tick the space(s) beside the language(s) you could speak then)

☐ English

☐ Chinese dialect

☐ Mandarin

☐ Malay

☐ Tamil

OTHER ANSWER: _____

8. What type of house do you live in?
(Tick the appropriate space)

☐ Compound brick house

☐ Semi-detached or terrace house

☐ Private apartment

☐ HDB flat or equivalent

☐ Wooden bungalow house

OTHER ANSWER: _____

9. Do you have to pay rent for your house or flat?

☐ Yes

☐ No

If Yes, how much? _____
(State amount)

10. How many bedrooms are there in your house or flat? _____
(State the number)

11. Where do you usually do your homework?
(Tick the appropriate space)

_____ Study-table in own bedroom

_____ Dinner-table

_____ Study room, different from bedroom

OTHER ANSWER: _____

12. Do you have a telephone at home?

_____ Yes

_____ No

13. Is there a radio in your home?

_____ Yes

_____ No

14. Is there a T.V. in your home?

_____ Yes

_____ No

15. Is there a refrigerator in your home?

_____ Yes

_____ No

16a) Do you have a car at home?

_____ Yes

_____ No

b) How do you go to school?

_____ Walk

_____ NTUC transport or School Bus

_____ Parents send me by car

_____ Driven-driven car

OTHER ANSWER: _____

17. Is there any room in your house that is air-conditioned?

_____ Yes

_____ No

18. Is there an electric fan in your home?

_____ Yes

_____ No

19. State the educational level of all brothers and sisters older than yourself:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

20. Besides your parents, are there other person(s) working in your home?

_____ Yes

_____ No

21. If Yes, state (a) the relationship of the person(s) to you, (b) the occupation of the person(s), (c) the highest educational level attained by the person(s) involved, in the following table:

Relationship	Occupation	Educational Level
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

22. What marks do your parents want you to get in school for most subjects?

_____ The highest mark in each subject

_____ Above 90%

_____ Above 80%

_____ Above 70%

_____ Above 60%

_____ Pass marks would be alright

OTHER ANSWER: _____

23. How often do they tell you that you must do well in school?

_____ All the time

_____ Once in a while

_____ Hardly any

_____ Never

OTHER ANSWER: _____

24. In your Primary 6 year, how was your choice of secondary schools made?

_____ Your parents made the decision for you

_____ Your older brothers/sisters/relatives made the choice for you

_____ Your parents talked it over with you and together you agreed on the schools

_____ You consulted your older brothers/sisters/relatives and they helped you to decide on the schools

_____ You made your own choice

OTHER ANSWER: _____

25. What sort of education would your parents want you to have after this year?

_____ Only technical education

_____ Only academic education

_____ Join the trade schools

_____ Any type will do

OTHER ANSWER: _____

26. Did your parents coach you or make special arrangements to make sure that you could pass your P.S.L.E.?

_____ Yes

_____ No

27. How often do they check on your schoolwork?

_____ Every day

_____ Once a week

_____ Once a month

_____ Once in a while

OTHER ANSWER: _____

28a) Do your parents always know about your school examinations?

_____ Yes

_____ No

b) Usually how do they know about them?

_____ They ask you

_____ You tell them

c) Do they ask you about how you fare after each examination?

_____ Yes

_____ No

d) How interested are they about your results?

_____ Always ask about them as soon as examinations are over

_____ Occasionally ask when the results would be known

_____ Never ask anything until the report book is brought home for signature

OTHER ANSWER: _____

29a) Have your parents ever talked to you about what you should do after Sec. IV?

_____ Yes

_____ No

b) If Yes, what do they want you to do?

_____ To go on to Pre-U

_____ Take up commercial or technical training

_____ Look for a job

OTHER ANSWER: _____

c) Have they ever talked to you about the job you should go into?

_____ Yes

_____ No

d) If Yes, what do you think they want you to become?

_____ salesman

_____ typist

_____ mechanic

_____ electrician

_____ chemist

_____ laboratory assistant

_____ draughtsman

_____ primary school teacher

_____ bank clerk

_____ hospital assistants/nurses

_____ lawyer

_____ real estate agent

_____ doctor

_____ secondary school teacher

_____ dentist

_____ accountant

_____ engineer

_____ book-keeper

29d) cont'd.

☐ architect

 ☐ pharmacist
☐ photographer

 ☐ university/college lecturer

OTHER ANSWER: _____

30a) Which of the following hobbies have you ever been involved in doing?

☐ stamp-collecting

 ☐ playing a musical instrument
☐ coin-collecting

 ☐ a lot of reading
☐ building models

 ☐ chemistry/electronics
☐ drawing

 ☐ learning to play chess
☐ photography

 ☐ working at puzzles

OTHERS: _____

☐ Have never been interested in any hobbies

b) In what hobbies or activities are you interested in?

☐ stamp-collecting

 ☐ coin-collecting
☐ drawing

 ☐ building models
☐ electronics

 ☐ chemistry sets
☐ swimming

 ☐ a lot of reading
☐ not interested in
 ANY HOBBY
 OTHERS: _____

c) Who has got you interested in the hobby?

☐ Both parents got you interested
☐ Mother
☐ Father
☐ An older brother/sister/relative got you interested
☐ Someone outside the home made you interested
☐ Became interested on your own

OTHER ANSWER: _____

31a) List some of the common activities that you often do together with your mother at home:

b) List some of the common activities that you often do together with your father at home:

c) List some of the common activities that you often do together with members of your family other than your parents at home:

32a) Below is a list of places of interest in Singapore. Tick those which you have been to:

- | | |
|--|---|
| <input type="checkbox"/> Haw Par Villa | <input type="checkbox"/> Van Kleeef Aquarium |
| <input type="checkbox"/> Botanical Gardens | <input type="checkbox"/> Japanese Gardens |
| <input type="checkbox"/> National Theatre | <input type="checkbox"/> Science Centre |
| <input type="checkbox"/> National Museum | <input type="checkbox"/> Paya Lebar Airport |
| <input type="checkbox"/> Jurong Bird Park | <input type="checkbox"/> Queen Elizabeth Walk |
| <input type="checkbox"/> Sentosa Island | <input type="checkbox"/> Chinese Gardens |

OTHERS:

b) With whom did you go to these places you have ticked?

- ☐ With family including parents
- ☐ With members of family, but not parents
- ☐ With people outside the family

OTHER ANSWERS:

33. During the last school holidays, how many times have you gone on outings (e.g. picnics, camping, etc.)

a) with your parents or other members of your family?

_____ A few times

_____ Once, because it takes up the whole holiday

_____ Just once

_____ None

b) with people outside the family?

_____ A few times

_____ Once, because it takes up the whole holiday

_____ Just once

_____ None

34a) Do you take any lessons outside school? (e.g. music, art, swimming, sports coaching etc.)

_____ Yes

_____ No

If Yes, list them here: _____

b) Who suggested that you should take these lessons?

_____ Both parents

_____ Father

_____ Mother

_____ A member of family other than parents

_____ Someone outside the family

_____ Yourself

35a) What do you like to do most when you return home from school?

- ☐ Do your homework, read, study
- ☐ Take courses: music, art, etc.
- ☐ Get involved in your hobby, name the hobby _____
- ☐ Play games outside the house
- ☐ Watch T.V. or listen to the radio
- ☐ Go to school for E.C.A.

OTHER ANSWERS: _____

b) After dinner what to you generally do?

- ☐ Do homework and then read (or just read)
- ☐ Do homework and then get involved with your hobby
- ☐ Read and watch some T.V.
- ☐ Watch T.V. or listen to the radio

OTHER ANSWERS: _____

36a) Do you have a dictionary of your own?

- ☐ Yes
- ☐ No

b) If Yes, what do you use it most often for?

- ☐ Do your English homework
- ☐ Look up new words you come across in your reading
- ☐ Look up words for crossword puzzles or games
- ☐ Bring it to school for English lessons
- ☐ Check meaning of words for English lessons
- ☐ Never use it

OTHER ANSWERS: _____

36c) Are there any dictionaries in your home?

_____ Yes

_____ No

If Yes, name them _____

d) On the average, how many times a week do you refer to your dictionary?

_____ More than 10 times a week

_____ About 10 times a week

_____ About 5 times a week

_____ Once a week

OTHER ANSWERS: _____

e) When did you first have the dictionary?

_____ Primary 4 and before

_____ Primary 5

_____ Primary 6

_____ Sec. I

_____ This year

OTHER ANSWERS: _____

f) Is this your first dictionary?

_____ Yes

_____ No

If No, how many more did you have before this one? _____

g) Who first taught you to use the dictionary?

_____ Father

_____ Mother

_____ A member of family other than parents

_____ Someone outside the family

_____ Found it out yourself

37a) Do you have an encyclopedia in the home?

_____ Yes

_____ No

b) If Yes, what kind are they? How long have you had them?
(Fill in the table below)

Type of Encyclopedia	Time had them			
	more than 1 year	2-3 yrs.	4-5 yrs.	more than 5 yrs.

c) How often do you use it to help you in your school work?

_____ Very regularly

_____ Sometimes

_____ Hardly ever

_____ Never

d) How often do your parents (or any family member) look at the encyclopedia with you together?

_____ About once a week

_____ Once a month

37d) cont'd.

_____ When we have come across something we want to
know more about

_____ Never

38a) Does your family subscribe to any magazine (e.g. Time, Newsweek,
Her World etc.)?

_____ Yes

_____ No

_____ Don't know

b) If Yes, what are they? _____

c) How often do you read them?

_____ Read every issue

_____ Read occasionally

_____ Never read

39a) What newspaper do you have in the house? (Tick all those you
have)

_____ Straits Times

_____ Berita Harian

_____ Sin Chew Jit Poh

_____ Nanyang Siang Pau

_____ Tami Murasu

_____ New Nation

OTHERS: _____

b) How often do you read the newspapers?

_____ Every day

_____ Weekends only

39b) cont'd.

_____ Once in a while

_____ Never read

OTHER ANSWERS: _____

c) Which section(s) of the newspaper interest(s) you most?

_____ World news

_____ News in Singapore

_____ Sports page

_____ Cinema page

_____ Advertisements

OTHER ANSWERS: _____

d) Who do you talk to most about the things you read in the newspapers?

_____ Your parents

_____ Members of family other than parents

_____ People outside the family

OTHER ANSWERS: _____

e) How often do your parents or any family member give you an article from a newspaper or magazine to read?

_____ Nearly every day

_____ Once or twice a week

_____ Less than once a week

_____ Rarely given

_____ Never

40a) Are you a member of the National Library or any of its branches?

_____ Yes

_____ No

b) If Yes, how long have you been a member?

_____ Just this year

_____ Joined last year

_____ Primary 4 and earlier

_____ Since Primary 5

_____ Since Primary 6

OTHER ANSWERS: _____

c) Who first told you to join the library?

_____ Both parents told you about it

_____ Father talked to you about it

_____ Mother talked to you about it

_____ A family member talked to you about it

_____ Someone outside the family talked to you about it

_____ Can't remember

OTHER ANSWERS: _____

d) What books did you read in the last school holidays?

e) What books did you read last month?

f) Do your parents ever look to see what type of books you are reading?

_____ Yes, quite often

_____ Sometimes

_____ Never

OTHER ANSWERS: _____

g) What percentage of the books you read are written in English?

_____ All

_____ Most of them

_____ About half

_____ Less than half

OTHER ANSWERS: _____

h) Do you get your books from other places?

_____ Yes

_____ No

If Yes, where else do you get them?

_____ School library

_____ Your parents (family members) buy them for you

_____ Church library

_____ Borrow from friends

OTHER ANSWERS: _____

41a) About how many hours do you watch T.V. on Saturday and Sunday?

_____ Don't watch T.V. on weekends

_____ Less than 1 hour each day

_____ Between 1 and 3 hours a day (or about 2 hours)

_____ Between 4 and 5 hours a day (or a few hours)

_____ More than 5 hours a day

41b) How about Monday to Friday? How long do you normally watch it each day?

- ☐ Don't watch T.V. on weekdays
- ☐ Less than 1 hour each day
- ☐ Between 1 and 3 hours each day (or about 2 hours)
- ☐ Between 4 and 5 hours a day (or a few hours)
- ☐ More than 5 hours a day

c) What T.V. programs do you usually watch?

- ☐ Most are educational (news, science documentation, ETV, school debates etc.)
- ☐ All are recreational (movies, sports, musical shows etc.)
- ☐ A mixture of educational and recreational programs
- ☐ Don't know

List the regular programs _____

d) How often do your parents talk about a T.V. program with you after it is over?

- ☐ Quite regularly
- ☐ Occasionally
- ☐ Have discussed only 1 or 2 programs
- ☐ Never had any follow-up discussions

e) What percentage of the programs you watch are in English?

- ☐ 100%
- ☐ Over 50%
- ☐ About 50%
- ☐ Less than 50%
- ☐ None or hardly any

42a) Do your parents know your best friends?

_____ Yes, all of them

_____ Yes, some of them

_____ No

b) If Yes, did your parents ever help you to choose them?

_____ Yes, all of them

_____ Yes, some of them

_____ No (none of them)

43a) Do you ever ask your parents questions about things that puzzle you?

_____ Yes

_____ No

b) If Yes, what do your parents usually do?

_____ Tell you the answers straight away

_____ Ask you further questions to make you think out the answer yourself

_____ Point out the other instances which makes the answer to your questions obvious to you

_____ Tell you to find the answer somewhere

_____ Dismiss the questions

OTHER ANSWERS: _____

44a) Do you prefer to spend your time at home with your parents or go out to play with friends?

_____ Stay at home with parents

_____ Go out to play with friends

b) If you prefer to stay home, what is your parents' reaction to it?

_____ Don't mind, haven't discouraged it, encouraged it

44b) cont'd.

- _____ Quite happy about it but haven't encouraged it
- _____ Allow it, but would prefer me to play with my friends
- _____ Try to discourage it

OTHER ANSWERS: _____

45a) Which of the following activities would your parents allow you to do by yourself or with a friend?

	YES	NO
sleep at a friend's house overnight	_____	_____
go on an overnight camping trip	_____	_____
go to the movies	_____	_____
go shopping	_____	_____
go on a picnic or hike	_____	_____
visit relatives by bus	_____	_____

b) Do your parents allow you to stay alone in the house by yourself at night?

- _____ Yes
- _____ No
- _____ Sometimes

46a) Do you have any pocket money?

- _____ Yes
- _____ No

b) If Yes, do your parents always check on how you spend it?

- _____ Yes
- _____ No
- _____ Sometimes

c) When you want to buy something expensive with your own pocket money, do your parents expect you to ask their permission?

_____ Yes, mother insists

_____ Sometimes would like you to let them know before you purchase it

_____ No

OTHER ANSWERS: _____

d) When you have new clothes, how do you usually get them?

_____ Your parents just bought them for you

_____ You ask your parents for the money and you get them yourself

_____ Your parents take you along to the stores and let you make your own choice

OTHER ANSWERS: _____

47a) Do your parents insist that you must let them know whenever you go out with friends or on your own?

_____ Yes

_____ No

b) If Yes, do you have to tell the time when you would be back?

_____ Yes

_____ No

c) When you can't return by the expected time, what was your parent's usual reaction?

_____ Very worried but relieved when you finally return

_____ Quite worried but didn't make a fuss of it

_____ Realize that it could happen sometimes

d) When you return home from an outing with friends what do your parents usually do?

_____ Ask you to tell them everything

47d) cont'd.

_____ Never ask you anything unless you tell them

_____ Just ask whether you enjoyed yourself

OTHER ANSWERS: _____

e) When you go to school or go on an outing, who decides what clothes you should wear?

_____ Your mother

_____ You yourself

_____ A family member other than parents

OTHER ANSWERS: _____

48. When you have difficulty with your school work or something else you are doing (e.g. fixing a toy, working on a puzzle), what do your parents usually do when they know it?

_____ Offer to do it for you immediately

_____ Sit down and help you with it

_____ Encourage you to try a new way and watch

_____ Leave you to it

_____ Tell you to ask someone who knows

49a) Is there somebody else in your family besides your parents whom you admire a lot?

_____ Yes

_____ No

If Yes, state his or her relation to you here: _____

b) Is there someone outside the family that you admire a lot?

_____ Yes

_____ No

c) What is it about the person(s) that makes you admire the person?

_____ Very clever, has high qualifications

_____ Knows a lot of things

_____ Can help you in your school work

_____ Travels a great deal

_____ Has a good job

OTHER ANSWERS: _____

50a) Who would you most like to be like? _____

b) Why? _____

51a) Do your parents ever say that they would like you to be like somebody?

_____ Yes

_____ No

b) If Yes, say who here: _____

c) What is the person like? _____

52a) Have you read any life-stories of great people in the last term?

_____ Yes

_____ No

b) If Yes, say who here: _____

53a) Do you get any pocket money regularly each week or each month?

_____ Yes

_____ No, you ask your parents only when you need to buy something

53a) cont'd.

_____ No, you get it occasionally

OTHER ANSWERS: _____

b) What do you usually do with your pocket money when you get it?

_____ Spend it immediately you get it and go without money for the rest of the week or month

_____ Put some in the POSB and keep some for bus fares, school recess, stationery, etc.

_____ Save some for buying something which you like very much, e.g. a watch, pen, clothes, etc.

_____ Keep some for buying gifts for members of the family

OTHER ANSWERS: _____

54. If someone gives you \$10, what would you do with it?

55a) Do you have a time-table for your own studies at home?

_____ Yes

_____ No

b) If Yes, how closely do you follow this pattern?

_____ Very regularly

_____ Regularly except when something unexpected happens

_____ Occasionally follow it

_____ Follow it only when you feel like studying

OTHER ANSWERS: _____

56a) Do you and your brothers/sisters help with the housework?

_____ Yes

_____ No

b) If Yes, how is this carried out?

- ☐ Your mother assigns work for each of you
- ☐ Both parents together assign the work
- ☐ You and your brothers and sisters agree among yourselves who should perform certain duties
- ☐ No set rules, when there's work to be done, mother or father just call anyone to do it
- ☐ No set rules, when we (you or your brothers or sisters) feel like helping, we would help

OTHER ANSWERS: _____

57. When do you usually have dinner?

- ☐ Regularly at 6 p.m.
- ☐ Regularly at 7 p.m.
- ☐ Regularly at 7:30 p.m.
- ☐ Anytime after 6 p.m.
- ☐ No fixed time, have dinner when everyone is home
- ☐ Start eating whenever anyone is hungry

OTHER ANSWERS: _____

58. What time do you usually go to bed?

- ☐ Regularly at 9 p.m.
- ☐ Regularly at 9:30 p.m.
- ☐ Regularly at 10:00 p.m.
- ☐ Usually between 10 p.m. - 11 p.m.
- ☐ No fixed time, go to bed whenever you are sleepy or when you've finished your work

OTHER ANSWERS: _____

59a) Did someone read to you before you could read yourself?

_____ Yes

_____ No

b) If Yes, how often?

_____ Every day

_____ Nearly every day (3-4 times)

_____ A couple of times a week (2 or 3)

_____ Less than once a week (or not very often)

OTHER ANSWERS: _____

c) Who used to do the reading?

_____ Both parents

_____ Mother

_____ Father

_____ Someone else in the family

OTHER ANSWERS: _____

60a) Do you read to your parents in English?

_____ Yes

_____ No

b) If Yes, how often?

_____ Every day'

_____ Nearly every day

_____ Once or twice a week

_____ Less than once a week

OTHER ANSWERS: _____

61a) How often do you speak English at home?

- ☐ All the time
- ☐ Over half the time (most of the time)
- ☐ Half the time
- ☐ Less than half the time
- ☐ Never or hardly ever

b) With whom do you speak English in the home?

- ☐ Father
- ☐ Mother
- ☐ Both parents
- ☐ Brothers and sisters
- ☐ Father, mother, brothers and sisters

OTHER ANSWERS: _____

62. What language is usually spoken at meal time?

- ☐ English
- ☐ Mandarin
- ☐ Malay
- ☐ Tamil
- ☐ Chinese dialect

OTHER ANSWERS: _____

63. Did either of your parents (or somebody else at home) help you to increase your English vocabulary by telling you the meaning of a new word?

- ☐ Every day tells you a new word
- ☐ Nearly every day
- ☐ A couple of times a week

63. cont'd.

- ☐ Once a week
- ☐ Less than once a week
- ☐ Never

64. How often does either of your parents (or someone else in the family) help you with your English grammar (e.g. when to use certain words, how to construct sentences)?

- ☐ Every day
- ☐ Nearly every day
- ☐ A couple of times a week
- ☐ Once a week
- ☐ Less than once a week
- ☐ Never

65. How particular are your parents (or other members of the family) about the way you speak English (good vocabulary, proper grammar, and so on)?

- ☐ Very strict
- ☐ Quite particular
- ☐ Don't care
- ☐ Unable to help

OTHER ANSWERS: _____

APPENDIX II

RATING SCHEME FOR HEQ ITEMS

APPENDIX II

RATING SCHEME FOR HEQ ITEMS

- 1+2-Number of siblings - Score given corresponds to total number given to questions 1 and 2.
- 3-Father's Occupation - 7 - Higher professional, administrative, or managerial.
 6 - Lower professional-executive, school teachers etc.
 5 - Skilled artisans (technicians, carpenters, etc.), trades, business.
 4 - Clerical, sales.
 3 - Highly skilled (manual)
 2 - Unskilled workers
 1 - Unemployed
- 4-Father's Education - 7 - Post-graduate
 6 - University degree
 5 - H.S.C. or college diploma
 4 - Cambridge School Certificate
 3 - Had some secondary education or completed primary education
 2 - Had some primary education
 1 - No schooling
- 5-Mother's Occupation - Same as for Father's.
- 6-Mother's Education - Same as for Father's.
- 7-Language before entering school - 7 - English only
 5 - English + dialect
 3 - School's second language but not English
 1 - Dialect only

- 8-11-Type of house
- 7 - Compound brick-house, more than 3 bedrooms, with separate study-room.
 - 6 - Compound brick-house with 3 bedrooms, semi-detached or terrace house with separate study-room.
 - 5 - Any of above type without separate study-room or private apartment with separate study-room.
 - 4 - Private apartment without separate study-room, wooden bungalow house with separate study-room, or HDB 3 bedrooms or more and has separate study-room.
 - 3 - Wooden bungalow house without separate study-room or HDB 3 bedrooms or more without separate study room.
 - 2 - HDB 2 bedrooms.
 - 1 - HDB 1 bedroom.
- 12-18-Material Wealth
- ONE point is given for each of the seven items listed from questions 12-18 inclusive.
- 19-Highest educational level of sib
- The highest educational level listed in this question is rated as has been done for parental education.
- 20+21-Occupation and education of highest wage earner, not parents
- Scores are given as for Father's education and occupation.
- 22-29Press for achievement:
- 22) 7 - Highest mark
- 6 - Above 80%
 - 5 - Above 70%
 - 4 - Above 60%

- 3 - Above 50%
 - 2 - Pass marks
 - 1 - Whatever marks make no difference
- 23)
- 7 - All the time
 - 5 - Once in a while
 - 3 - Hardly any
 - 1 - Never
- 24)
- 7 - Parents made the choice
 - 6 - Parents talked over
 - 5 - Older brothers etc. made the choice for you
 - 3 - You consulted your brothers/sisters/relatives
 - 1 - Your own choice
- 25)
- 7 - Only academic
 - 6 - Only technical
 - 5 - Only commercial
 - 4 - Academic or technical or commercial
 - 3 - Technical or trade school
 - 2 - Join the trade school
 - 1 - Any type will do
- 26)
- 7 - Coach, check every day or once a week
 - 6 - Coach, check once a month
- 27)
- 5 - No coach, check every day or once a week
 - 4 - Coach, check once in a while
 - 3 - Coach, no check; No coach, check once a month
 - 2 - No coach, check once in a while
 - 1 - No coach, no check
- 28)
- 7 - Yes, ask you, always ask
 - 6 - Yes, ask you, occasionally ask
 - 5 - Yes, ask you, never ask
 - 4 - Yes, you tell them, always ask
 - 3 - Yes, you tell them, occasionally ask

- 2 - Yes, you tell them, never ask
- 1 - No, no, never ask
- 29) 7 - Yes, go to Pre-U, yes, higher professional
- 6 - Yes, go to Pre-U, no
- 5 - Yes, go to Pre-U, yes, lower professional
- 4 - Yes, take up commercial or technical training, yes, lower professional; no, yes, higher professional
- 3 - Yes, look for a job, yes, clerical
- 2 - Yes, take up commercial or technical training, no; yes, look for a job, no
- 1 - No, no

30-35-Press for activeness:

+41

- 30a) 7 - More than 4 hobbies
- 6 - 4 hobbies
- 5 - 3 hobbies
- 4 - 2 hobbies
- 3 - 1 thought provoking hobby
- 2 - Any number, recreational hobbies
- 1 - Not interested in any hobby
- 30b) 7 - 3 hobbies or more, both parents
- +c) 6 - 3 hobbies or more, 1 parent; or 2 hobbies, both parents
- 5 - 3 hobbies or more, members of family; or 2 hobbies, 1 parent; or 1 hobby, both parents
- 4 - 2 hobbies, members of family; or 1 hobby, 1 parent
- 3 - 1 hobby, members of family; or recreational hobbies, both parents
- 2 - Interested in hobbies on your own; or recreational hobbies, members of family
- 1 - Not interested in hobbies
- 31a) 7 - 3 or more educational activities
- 6 - 2 educational activities

5 - 2 activities - 1 educational, 1 recreational

4 - 1 educational activity

3 - 2 or more recreational activities

2 - 1 recreational activity

1 - No activity

31b) Same as 31a.

31c) Same as 31a.

32a) 7 - 6 or more with family

+b) 6 - 6 or more with members of family, no parents; or 3-5 with family

5 - 3-5 with members of family, no parents

4 - Less than 3 with family

3 - Less than 3 with members of family, no parents

2 - 6 or more with people outside family

1 - Less than 6 with people outside family

33) 7 - A few times with family

6 - Once because it takes up the whole holiday, with family

5 - Just once, with family

4 - A few times with people outside the family

3 - Once because it takes up the whole holiday, with people outside the family

2 - Just once, with people outside the family

1 - None

34a) 7 - 2 or more extra-curricular and educational courses, both parents

+b)

6 - 2 or more extra-curricular and educational courses, 1 parent; or 1 extra-curricular and educational, both parents

5 - 1 extra curricular and educational, 1 parent; or 2 or more extra-curricular and educational, members of family; or

2 or more extra-curricular and recreational, both parents

- 4 - 1 extra-curricular and educational, members of family; or
1 extra-curricular and recreational, both parents; or 2
or more extra-curricular and recreational, 1 parent
 - 3 - 2 or more extra-curricular and recreational, members of
family; or 1 extra-curricular and recreational, 1 parent
 - 2 - 1 extra-curricular and recreational, members of family
 - 1 - No extra-curricular courses taken
- 35a) 7 - Take courses or get involved in thought provoking hobbies,
+b) do homework and then get involved in hobbies or do homework
and then read
- 6 - Take courses or get involved in thought provoking hobbies,
read and watch T.V.
 - 5 - Do homework, read and study, do homework and get involved
in hobbies or do homework and then read
 - 4 - Do homework, read and study, read and watch T.V.
 - 3 - Do homework, read and study, watch TV or listen to the
radio
 - 2 - Completely recreational, read and watch T.V.
 - 1 - Completely recreational, watch T.V. or listen to radio
- 41a) 7 - Watch T.V. for educational purposes only
- +b) 6 - Doesn't watch T.V. or less than 1 hour, mixed programs
- +c) 5 - Weekends only, recreational programs or 1-3 hours, mixed
programs
- 4 - Less than 1 hour, recreational programs or 4-5 hours, mixed
programs
 - 3 - 1-3 hours, recreational programs
 - 2 - 4-5 hours, recreational programs or more than 5 hours,
mixed programs
 - 1 - More than 5 hours, recreational programs
- 41d) 7 - Quite regularly
- 5 - Occasionally
 - 3 - Have discussed 1 or 2 programs
 - 1 - No follow-up discussions

36-40-Press for Intellectuality:

- 36a) 7 - Additional uses, more than 5 times a week
- +b) 6 - Additional uses, 4-5 times a week
- +d) 5 - School purposes, more than 5 times a week
 - 4 - Additional uses, 2-3 times a week or school purposes, 4-5 times a week
 - 3 - Additional purposes once a week or school purposes 2-3 times a week
 - 2 - School purposes once a week
 - 1 - No dictionary or has dictionary but never use it
- 36c) 7 - 3rd dictionary plus 2 or more dictionaries in the home
- +f) 6 - 3rd dictionary plus 1 dictionary in the home
 - 5 - 2nd dictionary plus 2 or more dictionary in the home
 - 4 - 2nd dictionary plus 1 dictionary or 3rd dictionary plus no other dictionary in the home
 - 3 - 1st dictionary plus 2 or more dictionaries in the home or 2nd dictionary plus no other dictionary in the home
 - 2 - 1st dictionary plus 1 dictionary in the home
 - 1 - 1st dictionary plus no other dictionary in home or no dictionary but there are other dictionaries in home
- 36e) 7 - Primary 4 and earlier, either parent
- +g) 6 - Primary 4 and earlier, member of family or Primary 5, either parent
 - 5 - Primary 5, member of family or Primary 6, either parent
 - 4 - Primary 6, member of family or Sec. I, either parent
 - 3 - Sec. I, member of family or this year, either parent
 - 2 - Any year, found it out yourself or someone outside family
 - 1 - No dictionary
- 37) 7 - 2 or more, use regularly, parents once a week since primary education
 - 6 - 2 or more, use regularly, parents once a week since secondary education; 2 or more, use regularly, parents once a

month since primary education; 2 or more, use sometimes, parents once a week since primary education

- 5 - 1 encyclopedia, use regularly, parents once a week since primary education; 2 or more, use regularly, parents once a month since secondary education; 2 or more, use sometimes, parents once a week or month since secondary education
 - 4 - 1 encyclopedia, use sometimes, parents once a week or month since primary or secondary education; 1 encyclopedia, use regularly, parents never since primary education; 1 encyclopedia, use regularly, parents once a month since secondary education; 2 or more, use regularly or sometimes, parents never since primary or secondary education
 - 3 - 1 encyclopedia, use sometimes, parents once a month or never since primary education or secondary education; 1 encyclopedia, use regularly, parents never since secondary education; 2 or more encyclopedias, use sometimes, parents never since secondary education
 - 2 - 1 encyclopedia, use sometimes, parents never since secondary education
 - 1 - No encyclopedia, never or hardly use
- 38) 7 - More than 3, all education, read every issue
- 6 - More than 3, mixed, read every issue; more than 3, all education, read occasionally; 2 educational, read every issue
 - 5 - 1-2 mixed, read every issue; more than 3, mixed, read occasionally; 1 educational, read every issue; 2 educational read occasionally
 - 4 - More than 3, all recreational, read every issue; 1-2 mixed, read occasionally; 1 educational, read occasionally
 - 3 - 1-2 both recreational, read every issue; more than 3, all recreational, read occasionally
 - 2 - 1-2 both recreational, read occasionally
 - 1 - No magazine, or never read

- 39a) 7 - At least 2 newspapers, all educational, every day
- +b) 6 - At least 2 newspapers, mixed, every day; 1 newspaper, all educational, every day; at least 2 newspapers, all educational, once in a while or weekends
- +40g) 5 - At least 2 newspapers, mixed, once in a while or weekends; 1 newspaper, all educational, once in a while or weekends
- +41e) 4 - 1 newspaper, mixed, every day; at least 2 newspapers, all recreational, every day
- +61) 3 - 1 newspaper, recreational, every day; 1 newspaper, mixed, once in a while or weekends; at least 2 newspapers, all recreational, once in a while or weekends
- 2 - 1 newspaper, recreational, once in a while or weekends
- 1 - No newspaper or never read
- 39d) 7 - Parents, article nearly every day
- +e) 6 - Parents, article once or twice a week; members of family, article nearly every day
- 5 - Parents, less than once a week; members of family, once or twice a week
- 4 - Parents, once in a while; members of family, less than once a week
- 3 - Parents or members of family, rarely given
- 2 - Parents or members of family, never given
- 1 - Never talk, never given
- 40a) 7 - Primary 4 and earlier, both parents
- +b) 6 - Primary 5, both parents; primary 4 and earlier, one parent or members of family
- +c) 5 - Primary 5, one parent or members of family; primary 6, both parents
- 4 - Primary 6, one parent or members of family; Sec. I, both parents
- 3 - Since Sec. I, one parent or members of family
- 2 - Self or people outside family regardless of when
- 1 - No

- 40d) 7 - More than 5 books, more than 2 sources, parents often check
 +e) 6 - 3-5 books, more than 2 sources, parents often check; more
 +f) than 5 books, more than 2 sources, parents sometimes check;
 +i) more than 5 books, 1-2 sources, parents often check
- 5 - 3-5 books, more than 2 sources, parents sometimes check;
 3-5 books, 1-2 sources, parents often check; more than 5
 books, more than 2 sources, parents never check; more than
 5 books, 1-2 sources, parents sometimes check
- 4 - 3-5 books, 1-2 sources, parents sometimes check; 3-5 books,
 more than 2 sources, parents never check; less than 3 books,
 regardless of number of sources, parents often check; more
 than 5 books, 1-2 sources, parents never check
- 3 - Less than 3 books, regardless of number of sources, parents
 sometimes check; 3-5 books, 1-2 sources, parents never check
- 2 - Less than 3 books, regardless of number of sources, parents
 never check
- 1 - No books read

41-48-Press for Independence:

- 41a) 7 - Parents don't know about boy's friends
 +b) 6 - Parents know about some of boy's friends, doesn't choose
 +c) for him
- 5 - Parents know about all boy's friends, doesn't choose for him
- 4 - Parents know about some of boy's friends, choose some of
 these for him
- 3 - Parents know about some of boy's friends, choose these for
 him
- 2 - Parents know all boy's friends, choose some for him
- 1 - Parents know all about boy's friends, choose all for him
- 42a) 7 - Ask you further questions to make you think out the answer
 +b) yourself
- 6 - Parents point out instances which made the answer clear to
 you
- 5 - Tell you to find the answer somewhere

- 4 - Tell you to ask someone who knows
 - 3 - Tell you the answer straight away
 - 2 - Dismiss the question
 - 1 - No
- 43a) 7 - Go out to play with friends
- +b) 5 - Try to discourage it
- 4 - Allow it but prefer me to play with friends
 - 2 - Don't mind but haven't encouraged or discouraged it
 - 1 - Quite happy but haven't encouraged it
- 44a) 7 - All yes
- 6 - All yes except ii
 - 5 - All yes except i and ii
 - 4 - Yes to iii, iv, v or vi
 - 3 - Yes to iii and vi
 - 2 - Yes to vi only
 - 1 - All no
- 45) 7 - Yes
- 4 - Sometimes
 - 1 - No
- 46a) 7 - No
- +b) 4 - Sometimes check
- 1 - Yes, parents always check or no pocket money
- 46c) 7 - No
- 4 - Sometimes
 - 1 - Mother insists or no pocket money
- 46d) 7 - You ask parents for the money
- 4 - Parents take you along
 - 1 - Parents bought them for you
- 47a) 7 - No, no
- +b) 5 - Yes, no
- +c) 3 - Yes, yes, realize that it could happen

- 2 - Yes, yes, quite worried but didn't make a fuss about it
- 1 - Yes, yes, very worried but relieved when you finally return
- 47d) 7 - Never ask anything, you yourself
- +e) 6 - Never ask you anything, family member; just ask how you enjoyed yourself, you yourself
- 5 - Never ask you, mother; ask you to tell everything, you yourself
- 4 - Just ask how you enjoy yourself, family member
- 3 - Just ask how you enjoyed yourself, mother
- 2 - Ask you to tell everything, family member
- 1 - Ask you to tell everything, mother
- 48) 7 - Leave you to it
- 6 - Encourage you to try a new way and watch
- 4 - Sit down and help you with it
- 3 - Tell you to ask someone who knows
- 2 - Sit down and help you with it
- 1 - Offer to do it for you immediately

49-52-Model Identification:

- 49-) 7 - Admiration for a member of family or at least 2 people
- 52) who have one of these: i) clever, high qualifications
ii) good job, iii) extensive knowledge
- 5 - Parental pressure to be like someone who has i) high qualifications ii) good job iii) extensive knowledge
- 3 - Read life-stories of at least two great people who have attained great success in their lives
- 1 - No identification with adult models

53-58-Planfulness in Family:

- 53-) 7 - Evidence of planning, delayed gratification and regularity
- 58) shown by answers to all questions
- 6 - Evidence of planning, delayed gratification and regularity as shown by answers to at least one question in each area

- 5 - Evidence of any 2 of the 3 areas, shown by positive answers to both questions in these 2
- 4 - Evidence of any 2 of the 3 areas, shown by positive answers to at least one question in each of these 2
- 3 - Evidence of 1 of the 3 areas, shown by positive answers to both questions in this one area
- 2 - Evidence of one positive answer to one of the questions
- 1 - No planning, immediate gratification, and irregularity

59-65-Press for English:

+39a+40g+41e

- 59a) 7 - 2 parents, read every day
- +b) 6 - 1 parent, read every day; both parents, read nearly
- +c) every day
- 5 - Someone in family, read every day; both parents, read a couple of times a week; 1 parent, read nearly every day
- 4 - 1 parent, read a couple of times a week; both parents read less than once a week
- 3 - Someone in family, read a couple of times a week; 1 parent, read less than once a week
- 2 - Someone in family, read less than once a week
- 1 - No
- 60a) 7 - Boy reads every day
- +b) 6 - Boy reads nearly every day
- 4 - Boy reads once or twice a week
- 3 - Boy reads less than once a week
- 1 - No
- 61a) 7 - Speaks English more than half the time, with both parents
- +b) or whole family
- +c) 6 - Speaks English more than half the time, with 1 parent only
- 5 - Speaks English more than half the time, with brothers and sisters only

- 4 - Speaks English half the time, with 1 parent only
 - 3 - Speaks English half the time, with brothers and sisters only
 - 2 - Speaks English half the time
 - 1 - Never or hardly speaks English
- 39a) 7 - Newspapers all English, books all English, T.V. all English,
+40g) meal-time all English
- +41e) 6 - Newspaper all English, Books more than 50% English, T.V.
+62) more than 50% English, meal-time mixed
- 5 - Newspaper all English, books more than 50% English, T.V.
more than 50% English, meal-time mixed; newspaper mixed,
books more than 50% English, T.V. more than 50% English,
meal-time all English
 - 4 - Newspaper mixed, books more than 50% English, T.V. more than
50% English, meal-time non-English; newspaper non-English,
books more than 50% English, T.V. more than 50% English,
meal-time mixed
 - 3 - Newspaper non-English, books more than 50% English, T.V.
more than 50% English, meal-time non-English; newspaper
mixed, books about 50% English, T.V. about 50% English,
meal-time non-English
 - 2 - Newspaper non-English, books about 50% English, T.V. about
50% English, meal-time non-English
 - 1 - Newspaper non-English, books less than 50% English, T.V. less
than 50% English, meal-time non-English
- 63) 7 - Every day/nearly every day, very strict
- +65) 6 - Every day/nearly every day, quite particular
- 5 - Couple of times a week/once a week, very strict
 - 4 - Couple of times a week/once a week, quite particular
 - 3 - Less than once a week, very strict
 - 2 - Less than once a week, quite particular
 - 1 - Never, unable to help or don't care
- 64) Same as above
- +65)

APPENDIX III

SCHAEFER CHILDREN'S REPORTS OF PARENTAL
BEHAVIOUR INVENTORY (CRPBI)

Schaefer Children's Report of
Parental Behaviours Inventory
(Mother Form)

INSTRUCTIONS

We are interested in learning more about the different experiences people have had in their families. We are therefore, asking a number of pupils to report their experiences during childhood.

If you did not grow up with your real mother but someone took her place in your life, please describe that person.

First fill in the personal data sheet on the next page and wait for further directions.

If you are ready, turn to the next page. This is how we are going to answer the statements. I will read out each statement and you follow the words silently as I go along. When I have finished reading, you circle the answer that most clearly describes the way your mother acts toward you. BE SURE TO MARK EACH ITEM BEFORE I READ THE NEXT ITEM.

If you think the item is LIKE your mother, circle (L)

If you think the item is SOMEWHAT LIKE your mother, circle (SL)

If you think the item is NOT LIKE your mother, circle (NL)

PERSONAL DATA SHEET

NAME _____ SEX _____

SCHOOL _____

CLASS _____

DATE OF BIRTH _____

RACE _____

Form for Mother	Like	Some- What Like	Not Like
Makes me feel better after talking over my worries with her.	L	SL	NL
Likes to talk to me and be with me much of the time.	L	SL	NL
Isn't very patient with me.	L	SL	NL
Sees to it that I know exactly what I may or may not do.	L	SL	NL
Says I'm very good natured.	L	SL	NL
Wants to know exactly where I am and what I am doing.	L	SL	NL
Decides what friends I can go around with.	L	SL	NL
Soon forgets a rule she has made.	L	SL	NL
Doesn't mind if I kid her about things.	L	SL	NL
Is easy with me.	L	SL	NL
Doesn't talk with me very much.	L	SL	NL
Will not talk to me when I displease her.	L	SL	NL
Seems to see my good points more than my faults.	L	SL	NL
Doesn't let me go places because something might happen to me.	L	SL	NL
Thinks my ideas are silly.	L	SL	NL
Is very strict with me.	L	SL	NL
Tells me I'm good looking.	L	SL	NL
Feels hurt when I don't follow advice.	L	SL	NL
Is always telling me how I should behave.	L	SL	NL
Usually doesn't find out about my misbehavior.	L	SL	NL
Enjoys it when I bring friends to my home.	L	SL	NL
Worries about how I will turn out, because she takes anything bad I do seriously.	L	SL	NL
Spends very little time with me.	L	SL	NL
Allows me to go out as often as I please.	L	SL	NL
Almost always speaks to me with a warm and friendly voice.	L	SL	NL
Is always thinking of things that will please me.	L	SL	NL
Says I'm a big problem.	L	SL	NL
Believes in having a lot of rules and sticking to them.	L	SL	NL
Tells me how much she loves me.	L	SL	NL
Is always checking on what I've been doing at school or at play.	L	SL	NL
Keeps reminding me about things I am not allowed to do.	L	SL	NL
Punishes me for doing something one day, but ignores it the next.	L	SL	NL
Allows me to tell her if I think my ideas are better than hers.	L	SL	NL
Lets me off easy when I do something wrong.	L	SL	NL
Almost never brings me a surprise or present.	L	SL	NL

Form for Mother	Like	Some- What Like	Not Like
Sometimes when she disapproves, doesn't say anything but is cold and distant for a while.	L	SL	NL
Understands my problems and my worries.	L	SL	NL
Seems to regret that I am growing up and am spending more time away from home.	L	SL	NL
Forgets to help me when I need it.	L	SL	NL
Sticks to a rule instead of allowing a lot of exceptions.	L	SL	NL
Likes to talk about what she has read with me.	L	SL	NL
Thinks I'm not grateful when I don't obey.	L	SL	NL
Tells me exactly how to do my work.	L	SL	NL
Doesn't pay much attention to my misbehavior.	L	SL	NL
Likes me to choose my own way to do things.	L	SL	NL
If I break a promise, doesn't trust me again for a long time.	L	SL	NL
Doesn't seem to think of me very often.	L	SL	NL
Doesn't tell me what time to be home when I go out.	L	SL	NL
Enjoys talking things over with me.	L	SL	NL
Gives me a lot of care and attention.	L	SL	NL
Sometimes wishes she didn't have any children.	L	SL	NL
Believes that all my bad behavior should be punished in some way.	L	SL	NL
Hugs and kisses me often.	L	SL	NL
Asks me to tell everything that happens when I'm away from home.	L	SL	NL
Doesn't forget very quickly the things I do wrong.	L	SL	NL
Wants me to tell her about it if I don't like the way she treats me.	L	SL	NL
Can't say no to anything I want.	L	SL	NL
Thinks I am just someone to "put up with".	L	SL	NL
Speaks to me in a cold, matter-of-fact voice when I offend her.	L	SL	NL
Enjoys going on drives, trips or visits with me.	L	SL	NL
Worries about me when I'm away.	L	SL	NL
Forgets to get me things I need.	L	SL	NL
Gives hard punishments.	L	SL	NL
Believes in showing her love for me.	L	SL	NL
Feels hurt by the things I do.	L	SL	NL
Tells me how to spend my free time.	L	SL	NL
Doesn't insist that I do my homework.	L	SL	NL
Lets me help to decide how to do things we're working on.	L	SL	NL
Says some day I'll be punished for my bad behavior.	L	SL	NL
Sometimes allows me to do things that she says are wrong.	L	SL	NL

Form for Mother	Like	Some- What Like	Not Like
<hr/>			
Doesn't seem to enjoy doing things with me.	L	SL	NL
Gives me as much freedom as I want.	L	SL	NL
Smiles at me very often.	L	SL	NL
Often gives up something to get something for me.	L	SL	NL
Is always getting after me.	L	SL	NL
Sees to it that I'm on time coming home from school or for meals.	L	SL	NL
Tries to treat me as an equal.	L	SL	NL
Keeps a careful check on me to make sure I have the right kind of friends.	L	SL	NL
Keeps after me about finishing my work.	L	SL	NL
Depends upon her mood whether a rule is enforced or not.	L	SL	NL
Makes me feel free when I'm with her.	L	SL	NL
Excuses my bad conduct.	L	SL	NL
Doesn't show that she loves me.	L	SL	NL
Is less friendly with me if I don't see things her way.	L	SL	NL
Is able to make me feel better when I am upset.	L	SL	NL
Becomes very involved in my life.	L	SL	NL
Almost always complains about what I do.	L	SL	NL
Punishes me when I don't obey.	L	SL	NL
Always listens to my ideas and opinions.	L	SL	NL
Tells me how much she has suffered for me.	L	SL	NL
Would like to be able to tell me what to do all the time.	L	SL	NL
Doesn't check up to see whether I have done what she told me.	L	SL	NL
Asks me what I think about how we should do things.	L	SL	NL
Thinks and talks about my misbehavior long after it's over.	L	SL	NL
Doesn't share many activities with me.	L	SL	NL
Lets me go any place I please without asking.	L	SL	NL
Enjoys doing things with me.	L	SL	NL
Makes me feel like the most important person in her life.	L	SL	NL
Gets cross and angry about little things I do.	L	SL	NL
Believes in punishing me to correct and improve my manners.	L	SL	NL
Often has long talks with me about the causes and reasons for things.	L	SL	NL
Wants to know with whom I've been when I've been out.	L	SL	NL
Is unhappy that I'm not better in school than I am.	L	SL	NL
Only keeps rules when it suits her.	L	SL	NL

Form for Mother	Like	Some- What Like	Not Like
Really wants me to tell her just how I feel about things.	L	SL	NL
Lets me stay up late if I keep asking.	L	SL	NL
Almost never goes on Sunday drives or picnics with me.	L	SL	NL
Will avoid looking at me when I've disappointed her.	L	SL	NL
Enjoys working with me in the house or yard.	L	SL	NL
Usually makes me the centre of her attention at home.	L	SL	NL
Often blows her top when I bother her.	L	SL	NL
Almost always punishes me in some way when I am bad.	L	SL	NL
Often praises me.	L	SL	NL
Says if I loved her, I'd do what she wants me to do.	L	SL	NL
Gets cross and nervous when I'm noisy around the house.	L	SL	NL
Seldom insists that I do anything.	L	SL	NL
Tries to understand how I see things.	L	SL	NL
Says that some day I'll be sorry that I wasn't better as a child.	L	SL	NL
Complains that I get on her nerves.	L	SL	NL
Lets me dress in any way I please.	L	SL	NL
Comforts me when I'm afraid.	L	SL	NL
Enjoys staying at home with me more than going out with friends.	L	SL	NL
Doesn't work with me.	L	SL	NL
Insists that I must do exactly as I'm told.	L	SL	NL
Encourages me to read.	L	SL	NL
Asks other people what I do away from home.	L	SL	NL
Loses her temper with me when I don't help around the house.	L	SL	NL
Frequently changes the rules I am supposed to follow.	L	SL	NL
Allows me to have friends at my home often.	L	SL	NL
Does not insist I obey if I complain or protest.	L	SL	NL
Hardly notices when I am good at home or in school.	L	SL	NL
If I take someone else's side in an argument, is cold and distant to me.	L	SL	NL
Cheers me up when I am sad.	L	SL	NL
Does not approve of my spending a lot of time away from home.	L	SL	NL
Doesn't get me things unless I ask over and over again.	L	SL	NL

Form for Mother	Like	Some- What Like	Not Like
Sees to it that I obey when she tells me something.	L	SL	NL
Tells me where to find out more about things I want to know.	L	SL	NL
Tells me of all the things she has done for me.	L	SL	NL
Wants to control whatever I do.	L	SL	NL
Does not bother to enforce rules.	L	SL	NL
Makes me feel at ease when I'm with her.	L	SL	NL
Thinks that any misbehavior is very serious and will have future consequences.	L	SL	NL
Is always finding fault with me.	L	SL	NL
Allows me to spend my money in any way I like.	L	SL	NL
Often speaks of the good things I do.	L	SL	NL
Makes her whole life center about her children.	L	SL	NL
Doesn't seem to know what I need or want.	L	SL	NL
Sees to it that I keep my clothes neat, clean, and in order.	L	SL	NL
Is happy to see me when I come from school or play.	L	SL	NL
Questions me in detail about what my friends and I discuss.	L	SL	NL
Doesn't give me any peace until I do what she says.	L	SL	NL
Insists I follow a rule one day and then forgets about it the next.	L	SL	NL
Gives me the choice of what to do whenever possible.	L	SL	NL
I can talk her out of an order, if I complain.	L	SL	NL
Often makes fun of me.	L	SL	NL
If I've hurt her feelings, stops talking to me until I please her again.	L	SL	NL
Has a good time at home with me.	L	SL	NL
Worries that I can't take care of myself unless she is around.	L	SL	NL
Acts as though I'm in the way.	L	SL	NL
If I do the least little thing that I shouldn't, punishes me.	L	SL	NL
Hugged or kissed me goodnight when I was small.	L	SL	NL
Says if I really cared for her, I would not do things that cause her to worry.	L	SL	NL
Is always trying to change me.	L	SL	NL
Lets me get away without doing work I had been given to do.	L	SL	NL
Is easy to talk to.	L	SL	NL
Says that sooner or later we always pay for bad behavior.	L	SL	NL
Wishes I were a different kind of person.	L	SL	NL

Form for Mother	Like	Some- What Like	Not Like
Lets me go out any evening I want.	L	SL	NL
Seems proud of the things I do.	L	SL	NL
Spends almost all of her free time wit her children.	L	SL	NL
Tells me to quit "hanging around the house" and go somewhere.	L	SL	NL
I have certain jobs to do and am not allowed to do anything else until they are done.	L	SL	NL
Is very interested in what I am learning at school.	L	SL	NL
Almost always wants to know who phoned me or wrote to me and what they said.	L	SL	NL
Doesn't like the way I act at home.	L	SL	NL
Changes her mind to make things easier for herself.	L	SL	NL
Lets me do things that other children my age do.	L	SL	NL
Can be talked into things easily.	L	SL	NL
Often seems glad to get away from me for a while.	L	SL	NL
When I upset her, won't have anything to do with me until I find a way to make up.	L	SL	NL
Isn't interested in changing me, but likes me as I am.	L	SL	NL
Wishes I would stay at home where she could take care of me.	L	SL	NL
Makes me feel I'm not loved.	L	SL	NL
Has more rules than I can remember, so is often punishing me.	L	SL	NL
Says I make her happy.	L	SL	NL
When I don't do as she wants, says I'm not grateful for all she has done for me.	L	SL	NL
Doesn't let me decide things for myself.	L	SL	NL
Lets me get away with a lot of things.	L	SL	NL
Tries to be a friend rather than a boss.	L	SL	NL
Will talk to me again and again about anything bad I do.	L	SL	NL
Is never interested in meeting or talking with my friends.	L	SL	NL
Lets me do anything I like to do.	L	SL	NL

APPENDIX III

CRPBI SCALES AND THEIR CORRESPONDING ITEMS

1. ACCEPTANCE

- 1.1 Makes me feel better after talking over my worries with her.
- 1.2 Seems to see my good points more than my faults.
- 1.3 Almost always speaks to me with a warm and friendly voice.
- 1.4 Understands my problems and my worries.
- 1.5 Enjoys talking things over with me.
- 1.6 Enjoys going on drives, trips or visits with me.
- 1.7 Smiles at me very often.
- 1.8 Is able to make me feel better when I'm upset.
- 1.9 Enjoys doing things with me.
- 1.10 Enjoys working with me in the house or yard.
- 1.11 Comforts me when I'm afraid.
- 1.12 Cheers me up when I'm sad.
- 1.13 Often speaks of the good things I do.
- 1.14 Has a good time at home with me.
- 1.15 Seems proud of the things I do.
- 1.16 Isn't interested in changing me, but likes me as I am.

2. CHILDCENTREDNESS

- 2.1 Likes to talk to me and be with me much of the time.
- 2.2 Is always thinking of things that will please me.
- 2.3 Gives me a lot of care and attention.
- 2.4 Often gives up something to get something for me.
- 2.5 Makes me feel like the most important person in her life.
- 2.6 Enjoys staying at home with me more than going out with friends.
- 2.7 Makes her whole life centre about her children.
- 2.8 Spends almost all her free time with her children.

3. POSSESSIVENESS

- 3.1 Doesn't let me go places because something might happen to me.
- 3.2 Seems to regret that I am growing up and am staying more time away from home.
- 3.3 Worries about me when I'm away.
- 3.4 Becomes very involved in my life.
- 3.5 Usually makes me the centre of her attention at home.
- 3.6 Does not approve of my spending a lot of time away from home.
- 3.7 Worries that I can't take care of myself unless she is around.
- 3.8 Wishes I would stay at home where she could take care of me.

4. REJECTION

- 4.1 Isn't very patient with me.
- 4.2 Thinks my ideas are silly.
- 4.3 Says that I'm a big problem.
- 4.4 Forgets to help me when I need it.
- 4.5 Sometimes wishes that she didn't have any children.
- 4.6 Forgets to get me things I need.
- 4.7 Is always getting after me.
- 4.8 Almost always complains about what I do.
- 4.9 Gets cross and angry about little things I do.
- 4.10 Often blows her top when I bother her.
- 4.11 Doesn't work with me.
- 4.12 Doesn't get me things unless I ask over and over again.
- 4.13 Doesn't seem to know what I need or want.
- 4.14 Acts as though I'm in the way.
- 4.15 Tells me to quit "hanging around the house" and go somewhere.
- 4.16 Makes me feel I'm not loved.

5. CONTROL

- 5.1 Sees to it that I know exactly what I may or may not do.
- 5.2 Believes in having a lot of rules and sticking to them.
- 5.3 Believes that all my bad behaviour should be punished in some way.
- 5.4 Sees to it that I'm on time coming home from school or for meals.
- 5.5 Believes in punishing me to correct and improve my manners.
- 5.6 Insists that I must do as I'm told.
- 5.7 Sees to it that I keep my clothes neat, clean, and in order.
- 5.8 I have certain jobs to do and am not allowed to do anything else until they are done.

6. ENFORCEMENT

- 6.1 Is very strict with me.
- 6.2 Sticks to a rule instead of allowing a lot of exceptions.
- 6.3 Gives hard punishments.
- 6.4 Punishes me when I don't obey.
- 6.5 Almost always punishes me in some way when I am bad.
- 6.6 Sees to it that I obey when she tells me something.
- 6.7 If I do the least little thing that I shouldn't, punishes me.
- 6.8 Has more rules than I can remember, so is often punishing me.

7. POSITIVE INVOLVEMENT

- 7.1 Says that I'm very good natured.
- 7.2 Tells me I'm good looking.
- 7.3 Tells me how much she loves.

- 7.4 Likes to talk about what she has read with me.
- 7.5 Hugs and kisses me often.
- 7.6 Believes in showing her love to me.
- 7.7 Tries to treat me as an equal.
- 7.8 Always listens to my ideas and opinions.
- 7.9 Often has long talks with me about the causes and reasons for things.
- 7.10 Often praises me.
- 7.11 Encourages me to read.
- 7.12 Tells me where to find out more about things I want to know.
- 7.13 Is happy to see me when I come home from school or play.
- 7.14 Hugged and kissed me goodnight when I was small.
- 7.15 Is very interested in what I am learning at school.
- 7.16 Says I make her happy.

8. INTRUSIVENESS

- 8.1 Wants to know exactly where I am and what I am doing.
- 8.2 Is always checking on what I've been doing at school or at play.
- 8.3 Asks me to tell everything that happens when I'm away from home.
- 8.4 Keeps a careful check on me to make sure I have the right kind of friends.
- 8.5 Wants to know with whom I've been when I've been out.
- 8.6 Asks other people what I do away from home.
- 8.7 Questions me in detail about what my friends and I discuss.
- 8.8 Almost always wants to know who phoned or wrote to me and what they said.

9. CONTROL THROUGH GUILT

- 9.1 Feels hurt when I don't follow advice.
- 9.2 Thinks I'm not grateful when I don't obey.
- 9.3 Feels hurt by the things I do.
- 9.4 Tells me how much she has suffered for me.
- 9.5 Says if I loved her, I'd do what she wants me to do.
- 9.6 Tells me of all the things she has done for me.
- 9.7 Says if I really cared for her, I would not do things that cause her to worry.
- 9.8 When I don't do as she wants, says I'm not grateful for all she has done for me.

10. HOSTILE CONTROL

- 10.1 Decides what friends I can go around with.
- 10.2 Is always telling me how I should behave.
- 10.3 Keeps reminding me about things I am not allowed to do.
- 10.4 Tells me exactly how to do my work.
- 10.5 Doesn't forget very easily the things I do wrong.

- 10.6 Tells me how to spend my free time.
- 10.7 Keeps after me about finishing my work.
- 10.8 Would like to be able to tell me what to do all the time.
- 10.9 Is unhappy that I'm not better in school than I am.
- 10.10 Gets cross and nervous when I'm noisy around the house.
- 10.11 Loses her temper with me when I don't help around the house.
- 10.12 Wants to control whatever I do.
- 10.13 Doesn't give me any peace until I do what she says.
- 10.14 Is always trying to change me.
- 10.15 Doesn't like the way I act at home.
- 10.16 Doesn't let me decide things for myself.

11. INCONSISTENT DISCIPLINE

- 11.1 Soon forgets a rule she has made.
- 11.2 Punishes me for doing something one day, but ignores it the next.
- 11.3 Sometimes allows me to do things that she says are wrong.
- 11.4 Depends upon her mood whether a rule is enforced or not.
- 11.5 Only keeps rules when it suits her.
- 11.6 Frequently changes the rules I am supposed to follow.
- 11.7 Insists I follow a rule one day and then forgets about it the next.
- 11.8 Changes her mind to make things easier for herself.

12. NONENFORCEMENT

- 12.1 Usually doesn't find out about my misbehaviour.
- 12.2 Doesn't pay much attention to my misbehaviour.
- 12.3 Doesn't insist that I do my homework.
- 12.4 Doesn't check up to see whether I have done what she told me.
- 12.5 Seldom insists that I do anything.
- 12.6 Does not bother to enforce rules.
- 12.7 Lets me get away without doing work I had been given to do.
- 12.8 Lets me get away with a lot of things.

13. ACCEPTANCE OF INDIVIDUATION

- 13.1 Doesn't mind if I kid her about things.
- 13.2 Enjoys it when I bring friends to my home.
- 13.3 Allows me to tell her if I think my ideas are better than hers.
- 13.4 Likes me to choose my own way to do things.
- 13.5 Wants me to tell her about it if I don't like the way she treats me.
- 13.6 Lets me decide how to do things we're working on.
- 13.7 Makes me feel free when I'm with her.
- 13.8 Asks me what I think about how we should do things.
- 13.9 Really wants me to tell her just how I feel about things.
- 13.10 Tries to understand how I see things.

- 13.11 Allows me to have friends at my home often.
- 13.12 Makes me feel at ease when I'm with her.
- 13.13 Gives me the choice of what to do whenever possible.
- 13.14 Is easy to talk to.
- 13.15 Lets me do things that children my age do.
- 13.16 Tries to be a friend rather than a boss.

14. LAX DISCIPLINE

- 14.1 Is easy with me.
- 14.2 Lets me off easy when I do something wrong.
- 14.3 Can't say no to anything I want.
- 14.4 Excuses my bad conduct.
- 14.5 Lets me stay up late if I keep asking.
- 14.6 Does not insist I obey if I complain or protest.
- 14.7 I can talk her out of an order, if I complain.
- 14.8 Can be talked into things easily.

15. INSTILLING PERSISTENT ANXIETY

- 15.1 Worries about how I will turn out, because she takes anything bad I do seriously.
- 15.2 If I break a promise, doesn't trust me again for a long time.
- 15.3 Says some day I'll be punished for my bad behaviour.
- 15.4 Thinks and talks about my misbehaviour long after its over.
- 15.5 Says that some day I'll be sorry that I wasn't better as a child.
- 15.6 Thinks that any misbehaviour is very serious and will have future consequences.
- 15.7 Says that sooner or later we always pay for bad behaviour.
- 15.8 Will talk to me again and again about anything bad I do.

16. HOSTILE DETACHMENT

- 16.1 Doesn't talk with me very much.
- 16.2 Spends very little time with me.
- 16.3 Almost never brings me a surprise or present.
- 16.4 Doesn't seem to think of me very often.
- 16.5 Thinks that I am just someone to "put up with".
- 16.6 Doesn't seem to enjoy doing things with me.
- 16.7 Doesn't show that she loves me.
- 16.8 Doesn't share many activities with me.
- 16.9 Almost never goes on Sunday drives or picnics with me.
- 16.10 Complains that I get on her nerves.
- 16.11 Hardly notices when I'm good at home or in school.
- 16.12 Is always finding fault with me.
- 16.13 Often makes fun of me.
- 16.14 Wishes I were a different kind of person.

- 16.15 Often seems glad to get away from me for a while.
- 16.16 Is never interested in meeting or talking with my friends.

17. WITHDRAWAL OF RELATIONS

- 17.1 Will not talk to me when I displease her.
- 17.2 Sometimes when she disapproves, doesn't say anything but is cold and distant for a while.
- 17.3 Speaks to me in a cold, matter-of-fact voice when I offend her.
- 17.4 Is less friendly with me if I don't see things her way.
- 17.5 Will avoid looking at me when I've disappointed her.
- 17.6 If I take someone else's side in an argument, is cold and distant to me.
- 17.7 If I've hurt her feelings, stops talking to me until I please her again.
- 17.8 When I upset her, won't have anything to do with me until I find a way to make up.

18. EXTREME AUTONOMY

- 18.1 Allows me to go out as often as I please.
- 18.2 Doesn't tell me what time to be home when I go out.
- 18.3 Gives me as much freedom as I want.
- 18.4 Lets me go any place I please without asking.
- 18.5 Lets me dress in any way I please.
- 18.6 Allows me to spend my money in any way I like.
- 18.7 Lets me out any evening I want.
- 18.8 Lets me do anything I like to do.

APPENDIX IV
LIST OF PARTICIPATING SCHOOLS

APPENDIX IV
PARTICIPATING SCHOOLS IN PILOT
AND MAIN STUDIES

Participating Schools in Pilot Testing:

1. Broadrick Secondary School
2. Gan Eng Seng Secondary School
3. St. Andrew's Secondary School

Participating Schools in Main Study:

1. Maju Secondary School
2. Sekolah Menengah Tun Sri Lanang
3. Swiss Cottage Secondary School
4. Yusof Ishak Secondary School

APPENDIX V

MEANS AND STANDARD DEVIATIONS OF ABILITY
MEASURES FOR CHINESE AND MALAY SAMPLES

APPENDIX V

MEANS AND STANDARD DEVIATIONS OF
ABILITY MEASURES FOR CHINESE AND MALAY SAMPLES

Ability Measures	CHINESE		MALAYS	
	MEANS	S.Ds.	MEANS	S.Ds.
1. Directions	3.14	1.73	1.94	1.41
2. Verbal Opposites	6.07	2.04	4.84	1.65
3. Numerical Series	4.75	1.83	3.36	1.54
4. Verbal Analogies	3.24	1.46	2.71	1.26
5. Simple Arithmetic Computation	2.87	2.02	1.65	1.62
6. Synonyms	3.82	1.88	2.92	1.60
7. Analogies	6.29	2.48	4.69	2.10
8. Sames	7.92	3.08	6.05	2.86
9. Subtractions	6.57	2.70	4.56	2.60
10. Series	7.61	2.70	5.46	2.53
11. Superimpositions	6.10	2.68	4.60	2.38
12. Reading	35.41	7.50	27.93	7.34
13. Mathematics	26.99	9.90	12.59	7.51
14. Science	27.29	9.91	13.89	7.79
15. Addition	38.59	10.22	27.93	8.22
16. Division	27.27	10.70	13.86	9.95
17. Subtraction & Multiplication	46.08	13.00	32.61	11.39
18. Raven Progressive Matrices (A)	11.42	0.79	11.19	0.90
19. Raven Progressive Matrices (B)	10.68	1.52	9.49	2.39
20. Raven Progressive Matrices (C)	9.64	1.55	7.79	2.44
21. Raven Progressive Matrices (D)	9.03	1.62	7.89	2.50
22. Raven Progressive Matrices (E)	7.18	2.20	5.15	2.54
23. Hidden Figures	9.49	4.54	7.43	3.99
24. Hidden Patterns	78.50	20.52	66.77	18.92
25. GEFT (Witkin)	13.05	4.21	11.56	4.70
26. Gestalt Completion	10.68	3.65	11.77	3.35
27. Concealed Words	15.42	4.77	17.14	5.00
28. Letter Sets	14.48	4.95	12.26	4.85
29. Figure Classification	91.14	28.51	93.31	40.04
30. Cube Comparisons	24.56	5.52	21.06	5.37
31. Card Rotation	105.97	36.32	101.74	36.66
32. Form Board	97.90	38.11	103.09	37.49

APPENDIX VI
INTERCORRELATIONS AMONG ABILITY MEASURES
FOR CHINESE AND MALAY SAMPLES

APPENDIX VI

INTERCORRELATIONS* AMONG ABILITY MEASURES

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	-	-01	28	46	10	26	18	23	24	23	34	28	30	20	26	-19	07	21	20
2	22	-	30	03	26	06	14	10	14	-07	08	12	16	-01	18	13	-07	-11	-08
3	31	40	25	39	04	34	17	28	28	17	17	37	26	25	33	30	13	22	30
4	31	48	-	15	20	09	03	05	09	03	20	12	21	01	02	04	-06	18	05
5	37	47	40	-	20	41	28	47	36	34	42	44	39	17	33	26	08	27	23
6	13	48	38	34	-	13	11	21	13	13	35	31	32	-05	22	12	-08	-03	05
7	21	29	31	32	09	-	59	66	71	53	29	35	15	13	32	24	13	25	30
8	24	40	24	35	15	70	-	68	74	61	15	19	08	04	21	20	-02	04	13
9	23	44	28	40	19	69	75	-	72	65	32	43	24	13	37	22	18	23	36
10	24	38	40	39	17	74	82	76	-	63	32	38	22	17	34	27	10	16	33
11	27	30	24	29	08	62	59	66	59	-	30	38	17	12	28	17	16	20	25
12	21	43	19	38	51	21	22	23	20	20	-	58	64	09	35	21	03	21	33
13	15	22	22	17	30	11	04	17	16	05	40	-	65	34	56	44	05	21	38
14	18	22	15	21	39	18	11	13	15	08	56	69	-	22	43	40	02	15	27
15	09	19	34	09	15	13	08	10	14	04	11	33	13	-	50	70	-11	04	14
16	13	28	31	07	25	11	08	12	16	07	20	45	32	47	-	66	04	15	14
17	09	23	26	06	22	04	07	03	10	-06	19	45	29	67	68	-	-15	10	15
18	05	20	-04	06	-06	06	08	07	07	13	06	04	02	04	-03	-06	-	40	28
19	10	03	-03	06	05	07	07	13	03	10	19	19	09	13	07	12	21	-	51
20	23	21	33	26	24	10	14	22	17	09	23	32	25	18	13	19	26	31	-
21	-03	09	03	06	-00	-01	-04	13	00	-03	02	20	-00	19	02	09	16	30	33
22	11	20	33	24	09	20	10	20	23	12	11	22	13	14	04	10	15	20	43
23	09	23	24	26	08	31	22	32	27	30	23	34	30	04	25	15	07	10	30
24	16	23	25	23	04	19	19	24	20	29	20	27	30	23	31	32	14	10	32
25	08	26	11	22	18	18	19	26	20	25	12	23	16	-01	17	09	22	17	31
26	10	17	11	25	07	22	23	26	23	31	12	08	05	-02	-05	-09	14	02	26
27	12	13	08	09	00	08	07	15	13	22	19	25	16	26	15	17	14	23	23
28	22	26	35	31	22	25	14	26	22	21	25	34	24	27	23	24	07	07	20
29	-00	04	-01	02	-01	07	19	19	16	17	-04	01	-00	-00	05	07	03	-03	-07
30	14	22	14	12	15	24	23	27	20	21	18	23	12	26	18	23	06	08	17
31	10	33	10	17	15	03	10	09	05	12	18	08	07	03	12	08	15	03	04
32	-01	-08	07	-03	-09	-16	05	09	05	17	-08	-02	-07	04	-04	-01	-04	-19	-08

LOWER TRIANGLE = CHINESE INTERCORRELATIONS, UPPER TRIANGLE = MALAY INTERCORRELATIONS

*Decimal points omitted

21	22	23	24	25	26	27	28	29	30	31	32	Test Designations:
-02	25	17	14	26	00	09	29	03	18	11	03	1 = Directions
31	25	-09	01	02	-12	07	17	-02	07	00	-06	2 = Verbal Opposites
-01	15	18	28	36	-10	06	39	07	21	10	-04	3 = Numerical Series
25	30	05	02	10	09	24	10	-13	07	-08	-15	4 = Verbal Analogies
-01	05	23	33	41	-07	10	36	07	13	08	-11	5 = Simple Arith. Comp.
20	31	10	02	22	13	13	16	01	01	10	-06	6 = Synonyms
-00	10	13	20	30	-04	13	35	21	23	12	-05	7 = Analogies
16	10	09	06	17	-03	08	19	11	10	03	-08	8 = Sames
15	28	14	18	38	-08	-03	32	15	22	08	-13	9 = Subtractions
06	24	09	18	32	-03	12	36	09	20	12	-11	10 = Series
15	34	22	20	37	03	-01	29	09	26	06	-08	11 = Superimpositions
23	33	16	16	46	08	09	45	-10	07	-01	-29	12 = Reading
23	30	25	24	50	03	12	49	-08	11	12	-12	13 = Maths.
11	21	18	19	42	15	12	46	-14	03	01	-16	14 = Science
21	31	09	28	14	00	15	25	07	12	15	09	15 = Addition
19	13	09	17	25	01	-01	36	15	04	16	-01	16 = Division
26	20	07	16	16	-04	10	28	13	12	09	09	17 = Sub. + Mult.
50	39	12	19	36	01	-02	08	-06	21	01	-01	18 = RPM Set A
51	57	21	32	40	-05	01	20	-06	13	-07	-14	19 = RPM Set B
-	45	15	24	38	03	04	35	-07	17	-11	-14	20 = RPM Set C
29	-	22	29	38	03	02	30	-04	04	-02	06	21 = RPM Set D
10	30	-	45	44	22	21	38	-00	18	04	-21	22 = RPM Set E
19	33	56	-	43	04	11	13	-06	29	10	07	23 = Hidden Figures
08	29	54	47	-	24	17	24	-03	19	14	-10	24 = Hidden Patterns
23	15	30	32	35	-	34	46	05	09	01	-15	25 = GEFT (Witkin)
26	18	14	36	19	41	-	-06	05	-00	01	09	26 = Gestalt Completion
17	28	26	20	14	15	15	10	-09	15	05	-03	27 = Concealed Words
-09	-03	16	15	11	08	-	-	03	16	19	02	28 = Letter Sets
18	31	16	07	10	06	-09	14	-	-05	14	22	29 = Fig. Classification
06	04	18	22	12	18	-01	23	10	-	21	15	30 = Cube Comparison
15	-04	24	10	03	11	02	15	14	27	-	29	31 = Card Rotation
						-04	10	28	23	23	-	32 = Form Board

APPENDIX VII
MEANS AND STANDARD DEVIATIONS OF AFFECTIVE, PROCESS,
AND STATUS VARIABLES FOR CHINESE AND MALAY SAMPLES

APPENDIX VII

MEANS AND STANDARD DEVIATIONS OF
VARIABLES IN 1) AFFECTIVE, 2) PROCESS
AND 3) STATUS DOMAINS

	CHINESE		MALAYS	
	MEANS	S.D.	MEANS	S.D.
1) <u>AFFECTIVE DOMAIN</u>				
1. Acceptance	34.98	6.90	36.28	5.29
2. Childcentredness	17.32	3.50	18.21	2.85
3. Possessiveness	16.60	2.93	16.86	2.63
4. Rejection	24.92	5.27	27.11	5.10
5. Control	18.01	3.03	17.72	2.90
6. Enforcement	15.08	3.26	15.71	3.22
7. Positive Involvement	32.88	6.45	35.10	4.89
8. Intrusiveness	17.41	3.60	17.24	3.24
9. Control through Guilt	15.57	3.67	16.70	2.91
10. Hostile Control	32.81	5.09	33.96	4.28
11. Inconsistent Discipline	12.94	2.88	14.63	2.76
12. Nonenforcement	11.84	2.86	13.57	2.90
13. Acceptance of Individuation	33.42	5.62	33.51	4.52
14. Lax Discipline	13.81	2.72	14.98	2.63
15. Instilling Persistent Anxiety	15.67	3.23	15.62	2.98
16. Hostile Detachment	24.95	4.84	27.93	4.66
17. Withdrawal of Relations	13.26	3.03	15.16	2.95
18. Extreme Autonomy	12.59	3.24	13.92	3.49
2) <u>PROCESS DOMAIN</u>				
1. Press for School-achievement	30.97	7.39	34.23	6.92
2. Press for Activeness	31.74	6.44	31.22	6.39
3. Press for Intellectuality	27.32	7.14	27.95	7.87
4. Press for Independence	44.34	7.92	43.86	8.07
5. Model Identification	3.67	2.33	3.21	2.12
6. Planfulness in Family	4.01	1.36	4.45	1.53
7. Press for English	14.38	6.51	16.20	7.44

3) <u>STATUS DOMAIN</u>	CHINESE		MALAYS	
	MEANS	S.D.	MEANS	S.D.
1. Number of Siblings	5.57	2.45	6.19	2.58
2. Father's Occupation	3.63	1.33	3.20	1.09
3. Father's Education	2.35	0.83	2.39	0.92
4. Mother's Occupation	1.21	0.57	1.16	0.55
5. Mother's Education	1.67	0.92	1.46	0.79
6. Home Induction to School Languages	1.98	1.63	3.22	0.98
7. Type of House	2.77	1.58	2.22	1.28
8. Material Wealth	3.89	1.44	3.49	1.21
9. Highest Educational Level of Sib	3.24	1.72	2.87	1.45
10. Educational Level of Highest Wage Earner, Not Parents	1.86	1.44	1.73	1.29
11. Occupational Level of Highest Wage Earner, Not Parents	2.02	1.71	1.76	1.39

APPENDIX VIII

INTERCORRELATIONS AMONG 1) AFFECTIVE VARIABLES,
2) PROCESS VARIABLES, AND 3) STATUS VARIABLES
FOR CHINESE AND MALAY SAMPLES

APPENDIX VIII
INTERCORRELATIONS* AMONG STATUS-VARIABLES

Status Variables	1	2	3	4	5	6	7	8	9	10	11
1. Number of Siblings	-	-03	-01	-14	-12	10	-02	-00	21	22	20
2. Father's Occupation	-09	-	55	11	27	08	17	23	14	03	03
3. Father's Education	-16	50	-	11	42	12	17	21	12	-03	-06
4. Mother's Occupation	-18	-10	-05	-	42	12	-05	10	-05	06	03
5. Mother's Education	-23	37	52	10	-	06	12	09	02	-05	-04
6. Home Induction to Sch. Instructional Langs.	01	02	05	05	12	-	06	06	05	15	15
7. Type of House	10	51	43	-07	27	11	-	29	14	08	08
8. Material Wealth	09	46	42	-12	26	03	49	-	12	04	06
9. Highest Educationsl Level of Sibling	29	08	11	02	09	10	21	23	-	37	34
10. Education of Highest Wage Earner, Not Parents	22	-05	01	01	00	-03	-03	02	36	-	94
11. Occ. of Highest Wage Earner, Not Parents	23	-02	-01	04	-02	-02	01	04	34	94	-

*Decimal points omitted

Values above diagonal represent Malay data, below diagonal Chinese data.

INTERCORRELATIONS* AMONG PROCESS-VARIABLES

Process Variables	1	2	3	4	5	6	7
1. Press for School-achievement	-	27	31	-11	13	30	35
2. Press for Activeness	34	-	43	05	23	26	48
3. Press for Intellectuality	28	25	-	-05	27	29	36
4. Press for INdependence	-30	-09	-09	-	02	-09	-01
5. Model Identification	28	26	19	-13	-	10	17
6. Planfulness in Family	25	26	28	-19	20	-	31
7. Press for English	33	46	41	-11	28	24	-

*Decimal points omitted

Values above diagonal represent Malay data, below diagonal Chinese data.

Affective Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Acceptance	-	65	39	-03	39	17	71	40	27	27	07	-12	61	14	16	-11	21	03
2. Childcentredness	74	-	41	01	35	20	64	40	25	27	09	-12	49	15	12	03	26	04
3. Possessiveness	49	56	-	18	30	27	33	41	35	34	25	-05	29	26	36	21	42	-04
4. Rejection	-21	-06	23	-	05	42	04	19	27	20	52	40	13	31	43	62	47	25
5. Control	32	40	51	25	-	40	34	51	34	49	16	-07	26	02	34	08	32	-18
6. Enforcement	16	28	37	45	67	-	27	38	35	43	38	15	16	19	45	37	45	-02
7. Positive Involvement	83	81	57	-08	43	25	-	38	30	25	12	-02	58	20	21	-00	32	08
8. Intrusiveness	49	57	55	-01	55	34	63	-	36	49	14	-02	32	-01	33	08	32	-23
9. Control through Guilt	32	41	47	42	54	46	43	43	-	38	23	-10	33	10	46	12	39	-12
10. Hostile Control	34	44	53	35	68	64	47	65	62	-	15	10	29	12	36	15	33	-09
11. Inconsistent Discipline	06	13	25	49	17	28	11	16	32	28	-	28	12	26	38	54	37	16
12. Nonenforcement	-07	-08	06	48	-15	-03	-10	-22	05	-09	43	-	-03	18	04	48	28	41
13. Acceptance of Individuation	73	57	41	-24	26	04	71	50	26	29	09	-07	-	30	20	07	32	26
14. Lax Discipline	22	17	17	27	-04	-07	21	03	11	02	42	49	34	-	31	30	37	41
15. Instilling Persistent Anxiety	14	29	52	38	61	58	26	46	66	63	31	-03	17	06	-	34	49	02
16. Hostile Detachment	-27	-10	14	67	12	34	-13	-02	26	24	43	43	-27	21	35	-	48	32
17. Withdrawal of Relations	01	08	37	55	41	52	13	20	44	49	43	14	-02	17	44	46	-	22
18. Extreme Autonomy	15	12	-06	12	-26	-24	15	-13	02	-19	25	55	28	51	-09	18	-12	-

*Decimal points omitted

Values above diagonal represent Malay data, below diagonal Chinese data.

APPENDIX IX
SAMPLE ITEMS OF TEST MEASURES
IN THE ABILITY DOMAIN

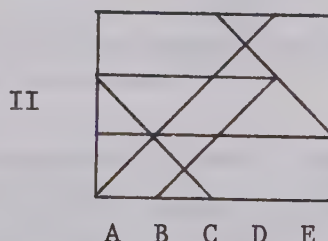
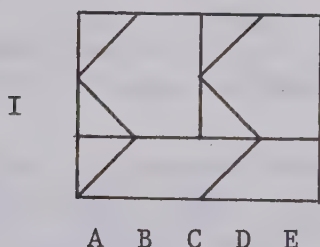
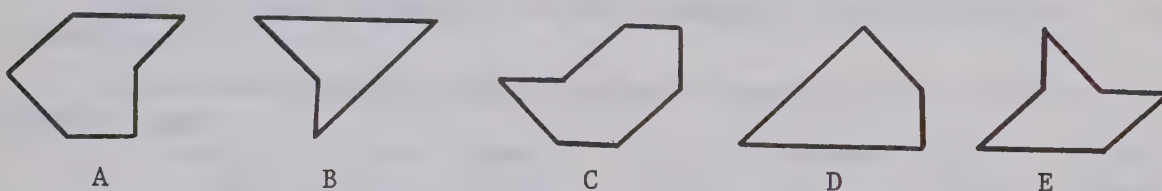
Name: _____

HIDDEN FIGURES TEST -- Cf-1

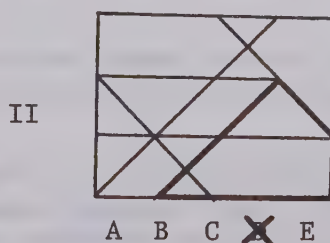
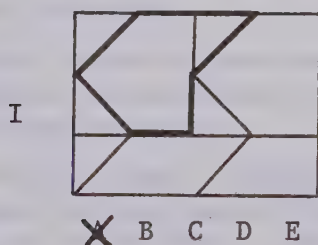
This is a test of your ability to tell which one of five simple figures can be found in a more complex pattern. At the top of each page in this test are five simple figures lettered A, B, C, D, and E. Beneath each row of figures is a page of patterns. Each pattern has a row of letters beneath it. Indicate your answer by putting an X through the letter of the figure which you find in the pattern.

NOTE: There is only one of these figures in each pattern, and this figure will always be right side up and exactly the same size as one of the lettered figures.

Now try these 2 examples.



The figures show how the figures are included in the problems. Figure A is in the first problem and figure D in the second.



Your score on this test will be the number marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the answer choices as wrong.

You will have 10 minutes for each of the two parts of this test. Each part has two pages. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Name: _____

HIDDEN PATTERNS -- Cf-2

How quickly can you recognize a figure that is hidden among other lines? This test contains many rows of patterns. In each pattern you are to look for the model shown below:

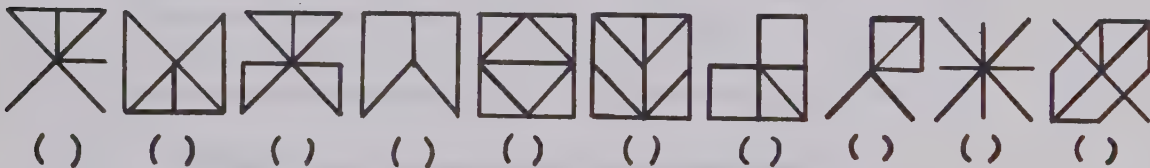


The model must always be in this position, not on its side or upside down.

In the next next row, when the model appears, it is shown by heavy lines:



Your task will be to place an X in the space below each pattern in which the model appears. Now, try this row:



You should have marked patterns 1, 3, 4, 8, and 10, because they contain the model.

Your score on this test will be the number marked correctly minus the number marked incorrectly. Work as quickly as you can without sacrificing accuracy.

You will have 2 minutes for each of the two parts of this test. Each part has two pages. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Copyright 1962 by Educational Testing Service
Adapted from Designs by L.L. Thurstone

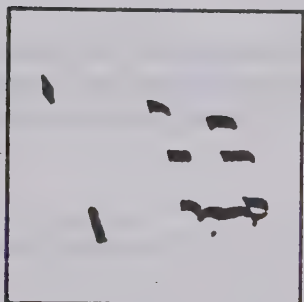
Name: _____

GESTALT COMPLETION TEST — Cs-1

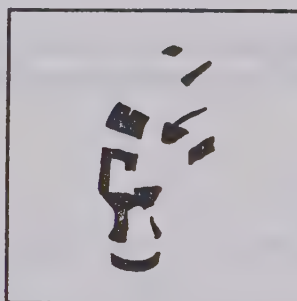
This is a test of your ability to perceive a whole picture even though it is not completely drawn. You are to use your imagination to fill in the missing parts.

Look at each incomplete picture and try to see what it is. Write on the line beneath it a word or a few words telling what the picture is. You need not describe it in detail; just name the picture or its important parts.

Try the sample pictures below.



A _____



B _____

Picture A is a flag and picture B is a hammer head.

Your score on this test will be the number of pictures identified correctly. Even if you are not sure of the correct identification, it will be to your advantage to guess. Work as rapidly as you can without sacrificing accuracy.

You will have 3 minutes for each of the two parts of this test. Each part has two pages. When you have finished Part 1 (pages 2 and 3), STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Name: _____

CONCEALED WORDS TEST -- Cs-2

This is a test of your ability to tell what a word is after parts of it have been erased. Look at the words printed below. The word north has been completely printed the first time; the second time parts of the letters have been erased.

north

north *north*

Now look at the words below. Parts of each word have been erased. Try to figure out what each word is. Write your answer on the line beside each printed word.

parents _____

easy _____

giant _____

You should have written parents, easy, and giant. All the words used in this test will be at least four letters long. No word will contain any capital letters.

You will have 3 minutes for each of the two parts of this test. Each part has two pages. When you finish Part 1, STOP. Do not go on to Part 2 until asked to do so.

Your score will be the number of correct words you write. Work as quickly as you can without sacrificing accuracy. If some words are difficult, skip them, and return to them later if you have time.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO

Name: _____

LETTER SETS TEST -- I-1

Each problem in this test has five groups of letters with four letters in each group. Four of the groups of letters are alike in some way. You are to find the rule that makes these four groups alike. The fifth group is different from them and will not fit this rule. Draw an X through the group of letters that is different.

NOTE: The rules will not be based on the sounds of groups of letters, the shapes of letters, or whether letter combinations from words or parts of words.

Examples:

A.	NOPQ	DEFL	ABCD	HIJK	UVWX
B.	NLIK	PLIK	QLIK	THIK	VLIK

In example A, four of the groups have letters in alphabetical order. An X has therefore been drawn through DEFL. In example B, four of the groups contain the letter L. Therefore, an X has been drawn through THIK.

Your score on this test will be the number of problems marked correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you are able to eliminate one or more of the letter groups.

You will be allowed 7 minutes for each of the two parts of this test. Each part has 1 page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.















Copyright © 1962 by Educational Testing Service. All rights reserved.
Suggested by Letter Grouping by L.L. Thurstone

Name: _____



















FIGURE CLASSIFICATION — I-3

This is a test of your ability to discover rules that explain things. In each problem on this test there are either two or three groups, each consisting of three figures. You are to look for something that is the same about the three figures in any one group and for things that make the groups different from one another.

Now look at the sample problem below. In the first line, the figures are divided into Group 1 and Group 2. The squares in Group 1 are shaded and the squares in Group 2 are not shaded. In the second line a 1 has been written under each figure that has a shaded square as in Group 1. A 2 has been written under each figure with an unshaded square as in Group 2.

Group 1				Group 2			
							
							
2	2	1	1	2	1	2	1

Now try this more difficult sample, which has three groups:

Group 1			Group 2			Group 3		
								
								

The figures in Group 1 consist of both straight and curved lines. The figures in Group 2 consist of curved lines only. The figures in Group 3 consist of straight lines only. As you can see, there are other details that have nothing to do with the rule. The answers are: 1, 1, 3, 1, 2, 1, 2, 2.

Your score on this test will be the number of figures identified correctly minus a fraction of the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea of the group to which the figure belongs.

You will have 8 minutes for each of the two parts of this test. Each part has 4 pages. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Copyright 1962 Educational Testing Service. All rights reserved.
Adapted from a University of North Carolina test.

Name: _____

ADDITION TEST -- N-1

This is a test to see how quickly and accurately you can add. It is not expected that you will finish all the problems in the time allowed.

You are to write your answers in the boxes below the problems. Several practice problems are given with the first one correctly worked. Practice for speed on the others. This practice may help your score.

Practice Problems:

4	7	12	84	7	34	17	45	31	80
9	6	5	54	38	81	50	41	52	78
1	15	67	72	80	51	74	89	19	15
<div style="border: 1px solid black; padding: 2px;">14</div>	<div style="border: 1px solid black; width: 40px; height: 30px;"></div>	<div style="border: 1px solid black; width: 40px; height: 30px;"></div>	<div style="border: 1px solid black; width: 40px; height: 30px;"></div>	<div style="border: 1px solid black; width: 40px; height: 30px;"></div>	<div style="border: 1px solid black; width: 40px; height: 30px;"></div>	<div style="border: 1px solid black; width: 40px; height: 30px;"></div>	<div style="border: 1px solid black; width: 40px; height: 30px;"></div>	<div style="border: 1px solid black; width: 40px; height: 30px;"></div>	<div style="border: 1px solid black; width: 40px; height: 30px;"></div>

Your score on this test will be the number of problems that are added correctly. Work as rapidly as you can without sacrificing accuracy.

You will have 2 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Copyright 1962 by Educational Testing Service

Name : _____

DIVISION TEST -- N-2

This is a test to see how quickly and accurately you can divide. It is not expected that you will finish all the problems in the time allowed.

You are to write your answers in the boxes below the problems. Several practice problems are given below with the first one correctly worked. Practice for speed on the others. This practice may help your score.

If you wish, you may use the space between the lines or at the bottom of the page for scratchwork. All of the problems come out even. There are no remainders.

Practice Problems:

$64 \div 4$ <div>16</div>	$150 \div 6$ <div></div>	$648 \div 8$ <div></div>	$238 \div 7$ <div></div>	$423 \div 9$ <div></div>
$546 \div 6$ <div></div>	$376 \div 8$ <div></div>	$153 \div 3$ <div></div>	$415 \div 5$ <div></div>	$117 \div 9$ <div></div>

Your score on this test will be the number of problems that are divided correctly. Work as rapidly as you can without sacrificing accuracy.

You will have 2 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Name: _____

SUBTRACTION AND MULTIPLICATION TEST -- N-3

This is a test to see how quickly and accurately you can subtract and multiply. It is not expected that you will finish all the problems in the time allowed.

You are to write your answers in the boxes below the problems. Several practice problems are given below with the first one correctly worked. Practice for speed on the others. This practice may help your score.

If you wish, you may use the space between the lines or at the bottom of the page for scratchwork.

Practice Problems:

Subtract:

98	40	37	84	81	76	59	90	46	56
-75	-35	-19	-47	-38	-40	-46	-31	-29	-23
<div style="border: 1px solid black; padding: 2px;">23</div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>

Multiply:

86	67	30	81	42	37	81	86	43	69
x6	x4	x3	x8	x5	x8	x4	x3	x6	x7
<div style="border: 1px solid black; padding: 2px;">5/6</div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>	<div style="border: 1px solid black; width: 30px; height: 20px;"></div>

Your score on this test will be the number of problems solved correctly. Work as rapidly as you can without sacrificing accuracy.

You will have 2 minutes for each of the two parts of this test. Each part has one page. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Copyright 1962 by Educational Testing Service

Name: _____

CARD ROTATIONS TEST — S-1

This is a test of your ability to see differences in figures. Look at the 5 triangle-shaped cards drawn below.



All of these drawings are of the same card, which has been slid around into different positions on the page.

Now look at the 2 cards below:



These two cards are not alike. The first cannot be made to look like the second by sliding it around on the page. It would have to be flipped over or made differently.

Each problem in this test consists of one card on the left of a vertical line and eight cards on the right. You are to decide whether each of the eight cards on the right is the same as or different from the card at the left. Put a plus (+) or cross (X) on the card, if it is the same as the one at the beginning of the row. Put a minus (-) on the card, if it is different from the one at the beginning of the row.

Practice on the following rows. The first row has been correctly marked for you.



Your score on this test will be the number of cards marked correctly minus the number marked incorrectly. Therefore, it will not be to your advantage to guess, unless you have some idea whether the card is the same or different. Work as quickly as you can without sacrificing accuracy.

You will have 4 minutes for each of the two parts of this test. Each part has 1 page. When you have finished Part 1, **STOP**. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Copyright © 1962 by Educational Testing Service. All rights reserved.
Suggested by Cards by L. L. Thurstone

Name: _____

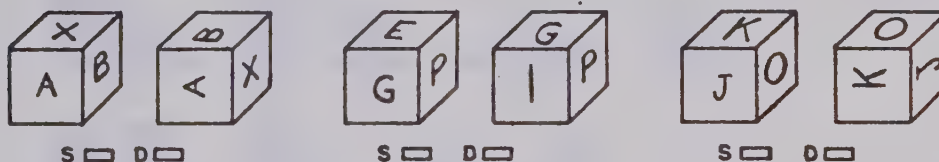
CUBE COMPARISONS TEST — S-2

Wooden blocks such as children play with are often cubical in shape and have a different letter or number on each of their six faces (top, bottom, and four sides). Each problem on the test consists of drawings of two cubes of this kind. Look at the two pairs of cubes below:



RULE: When a face is hidden on one cube and is turned up on the second, the letter or number on that face is correct unless that letter or number has already been shown in a different position on either of the cubes.

Be sure you see that this pair can represent the same cube.



Your score on this test will be the number marked correctly minus the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea which choice is correct. Work as quickly as you can without sacrificing accuracy.

You will have 3 minutes for each of the two parts of this test. Each part has 1 page. When you have finished Part 1, STOP.

DO NOT TURN THE PAGE UNTIL YOU ARE ASKED TO DO SO.

Copyright © 1962 by Educational Testing Service. All rights reserved.

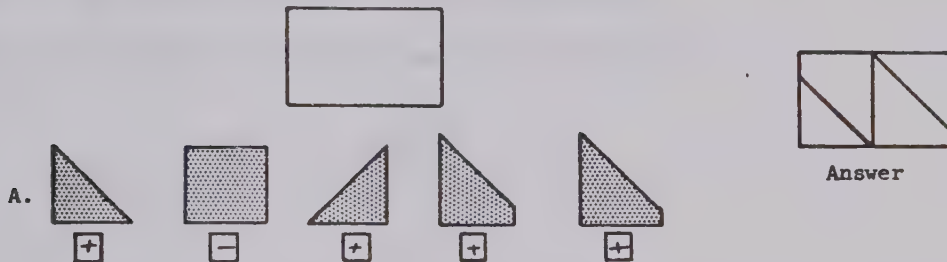
Adapted from Cubes by L. L. Thurstone

Name: _____

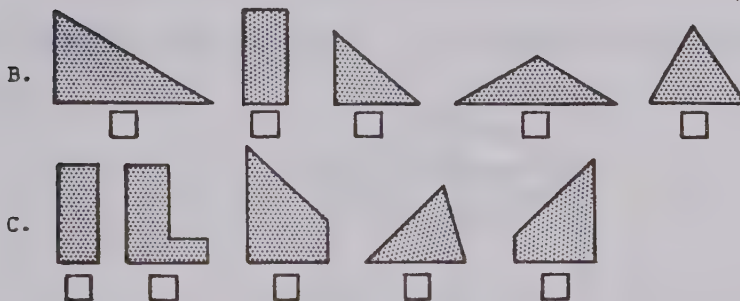
FORM BOARD TEST -- Vz-1

This is a test of your ability to tell what pieces can be put together to make a certain figure. Each test page is divided into two columns. At the top of each column is a geometrical figure. Beneath each figure are several problems. Each problem consists of a row of five shaded pieces. Your task is to decide which of the five shaded pieces will make the complete figure when put together. Any number of shaded pieces, from two to five, may be used to make the complete figure. Each piece may be turned around to any position but it cannot be turned over. It may help you to sketch the way the pieces fit together. You may use any blank space for doing this. When you know which pieces make the complete figure, mark a plus (+) in the box under ones that are used and a minus (-) in the box under ones that are not used.

In Example A, below, the rectangle can be made from the first, third, fourth, and fifth pieces. A plus has been marked in the box under these places. The second piece is not needed to make the rectangle. A minus has been marked in the box under it. The rectangle drawn to the right of the problem shows one way in which the four pieces could be put together.



Now try to decide which pieces in Examples B and C will make the rectangle.



In Example B, the first, fourth, and fifth pieces are needed. You should have marked a plus under these three pieces and a minus under the other two pieces. In Example C, the second, third, and fifth pieces should be marked with a plus and the first and fourth with a minus.

Your score on this test will be the number marked correctly minus the number marked incorrectly. Therefore, it will not be to your advantage to guess unless you have some idea whether or not the piece is correct.

You will have 8 minutes for each of the two parts of this test. Each part has 2 pages. When you have finished Part 1 (pages 2 and 3), STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

Copyright © 1962 by Educational Testing Service. All rights reserved.

GROUP EMBEDDED FIGURES TEST

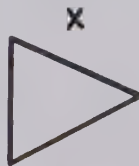
By Philip K. Oltman, Evelyn Raskin, & Herman A. Witkin

Name _____ Sex _____

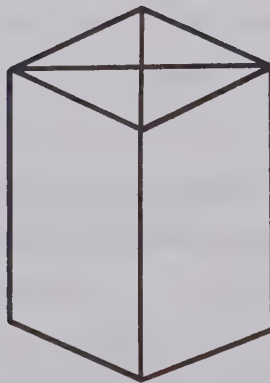
Today's date _____ Birth date _____

INSTRUCTIONS: This is a test of your ability to find a simple form when it is hidden within a complex pattern.

Here is a simple form which we have labeled "X":



This simple form, named "X", is hidden within the more complex figure below:



Try to find the simple form in the complex figure and trace it in pencil directly over the lines of the complex figure. It is the SAME SIZE, in the SAME PROPORTIONS, and FACES IN THE SAME DIRECTION within the complex figure as when it appeared alone.

When you finish, turn the page to check your solution.

DIRECTIONS FOR PART ONE

(STEP 4A MATHS., READING AND SCIENCE TESTS)

Each of the questions or incomplete statements in this test is followed by four suggested answers. You are to decide which one of these answers you should choose.

You must mark all of your answers on the separate answer sheet you have been given; this test booklet should not be marked in any way. You must mark your answer sheet by blackening the space having the same letter as the answer you have chosen. For example:

0 Which one of the following is an animal?

- A Bed
- B Dog
- C Chair
- D Box

Since a dog is an animal, you should choose the answer lettered B. On your answer sheet, you would first find the row of spaces numbered the same as the question - in the example above, it is 0. Then you would blacken the space in this row which has the same letter as the answer you have chosen. See how the example has been marked on your answer sheet.

Make your answer marks heavy and black. Mark only one answer for each question. If you change your mind about an answer, be sure to erase the first mark completely.

Do not turn this page until you are told to do so.

INSTRUCTIONS

Below are some examples of the test. Do them now.

Write your answers on the answer sheet. Write the number, not the word.

Some of the examples are already done for you.

DO NOT WRITE ANYTHING ON THIS PAPER

EXAMPLES.

E 1	1, 2, 3, 4, 5, 6, 7, 8, 9. Write down the largest of these figures.	Q 1
E 2	1, 2, 3, 4, 5, 6, 7, 8, 9. Write down the middle one of these figures.	Q 2
E 3	Late means the opposite of..... <div style="display: flex; justify-content: space-around; width: 100%;"> 12345 </div> appointment, early, behind, postponed, immediate.	Q 3
E 4	Big means the opposite of..... <div style="display: flex; justify-content: space-around; width: 100%;"> 12345 </div> tall, large, place, small, high.	Q 4
E 5	1, 4, 7, 10, 13..... What number comes next?	Q 5
E 6	2, 4, 8, 16, 32..... What number comes next?	Q 6
E 7	Fish is to swim as bird is to..... <div style="display: flex; justify-content: space-around; width: 100%;"> 12345 </div> man, fly, walk, aeroplane, sparrow.	Q 7
E 8	Black is to white as bad is to..... <div style="display: flex; justify-content: space-around; width: 100%;"> 12345 </div> evil, red, try, good, right.	Q 8
E 9	Here are three figures: 325. Add the largest two figures together and divide the total by the smallest figure.	Q 9
E 10	Here are three figures: 594. Subtract the smallest figure from the biggest and multiply the result by the figure printed immediately before the biggest figure.	Q 10
E 11	Young means the same as..... <div style="display: flex; justify-content: space-around; width: 100%;"> 12345 </div> youthful, ancient, vigorous, hot, baby.	Q 11
E 12	Couch means the same as..... <div style="display: flex; justify-content: space-around; width: 100%;"> 12345 </div> chair, table, lying, piano, sofa.	Q 12

If there is anything you do not understand, please ask the tester *now*.









































































DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO.

All rights reserved.

Sole Distributors: National Foundation for Educational Research in England and Wales, The Mere, Upton Park, Slough, Bucks.

5.

PART II.
EXAMPLES.

QU. No.	DO NOT WRITE ANYTHING ON THIS PAPER.					QU. No.
1	 IS To  AS  IS To					1
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					
2	 IS To  AS  IS To					2
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					
3	 IS THE SAME AS					3
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					
4	 IS THE SAME AS					4
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					
5	FROM  TAKE  AND THERE IS LEFT					5
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					
6	FROM  TAKE  AND THERE IS LEFT					6
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					
7	   WHICH OF THE FOLLOWING COMES NEXT?					7
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					
8	   WHICH OF THE FOLLOWING COMES NEXT?					8
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					
9	 PLACED EXACTLY ON TOP OF  GIVES THE FOLLOWING OUTLINE					9
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					
10	 PLACED EXACTLY ON TOP OF  GIVES THE FOLLOWING OUTLINE					10
	<div style="display: flex; justify-content: space-around;"> 12345 </div> <div style="display: flex; justify-content: space-around;">  </div>					

DO NOT TURN OVER UNTIL YOU ARE TOLD TO DO SO.



B30149